Varian 3900 GC Control Driver User Guide

Scion Instruments
1 Bain Square
Livingston, EH547DQ
United Kingdom

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Introduction

This document describes the configuration of the Varian 3900 GC driver. It also explains how to build a control method for this driver, how to start and view a running acquisition, and what actions are available during an analysis.

The 3900 GC has a single 1177 split/splitless or a 1041 injector equipped with Injector Electronic Flow Control, an FID or a TCD detector with Electronic Flow Control, and optionally, a keypad and Ethernet communications.

CompassCDS Configuration Manager allows you to configure the 3900 GC without a keypad for the appropriate column dimensions and temperature limits, and to perform EFC and autosampler calibrations. All these functions can be accomplished locally when the 3900 GC is equipped with a keypad.

Installation and Configuration

Installing the Driver Software

To install the CompassCDS Drivers software, refer to CompassCDS installation Guide.

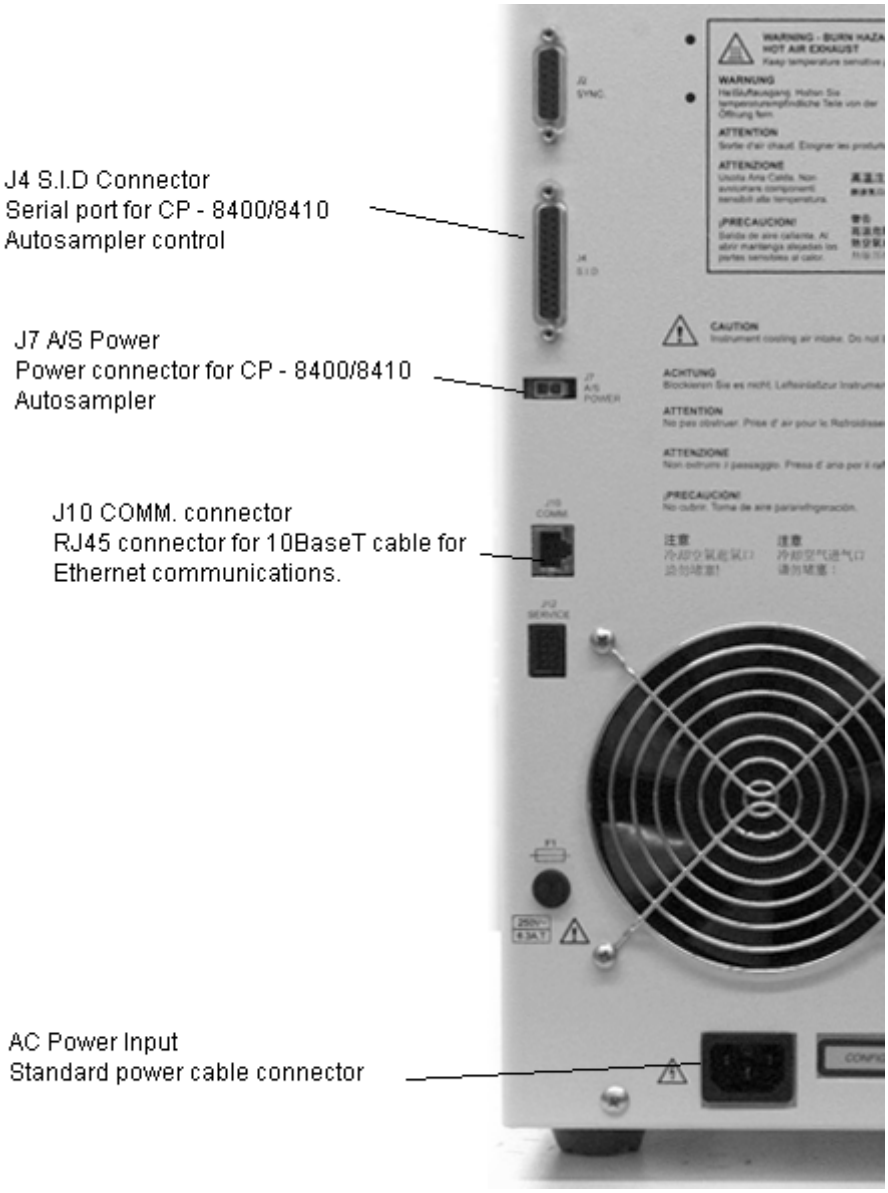
Configuring the GC Communications

Ethernet Communications

The 3900 Gas Chromatograph uses Ethernet® as the method of communication for instrument control and for sending digital data to the external data system.

The Ethernet connection is made at the back at the 3900 GC (J10 COMM. connector). There are two types of Ethernet cables:

- An Ethernet crossover cable is used when the 3900 GC is connected directly to the CompassCDS PC and the PC is not connected to a company network.
- A standard Ethernet patch cable is used when the 3900 GC is connected to a company Ethernet network. In this case, you will need to use an Ethernet 10BaseT hub or switch.



The 3900 GC uses TCP/IP (Transmission Control Protocol / Internet Protocol) to communicate over the Ethernet network and needs to be given a unique IP address to identify the instrument.

A BOOTP Server is used to send IP addresses to TCP/IP devices.

The BOOTP Server lists Ethernet (MAC) addresses along with the IP addresses that are to be assigned to the corresponding devices.

To configure the BOOTP server, refer to the CompassCDS installation Guide.

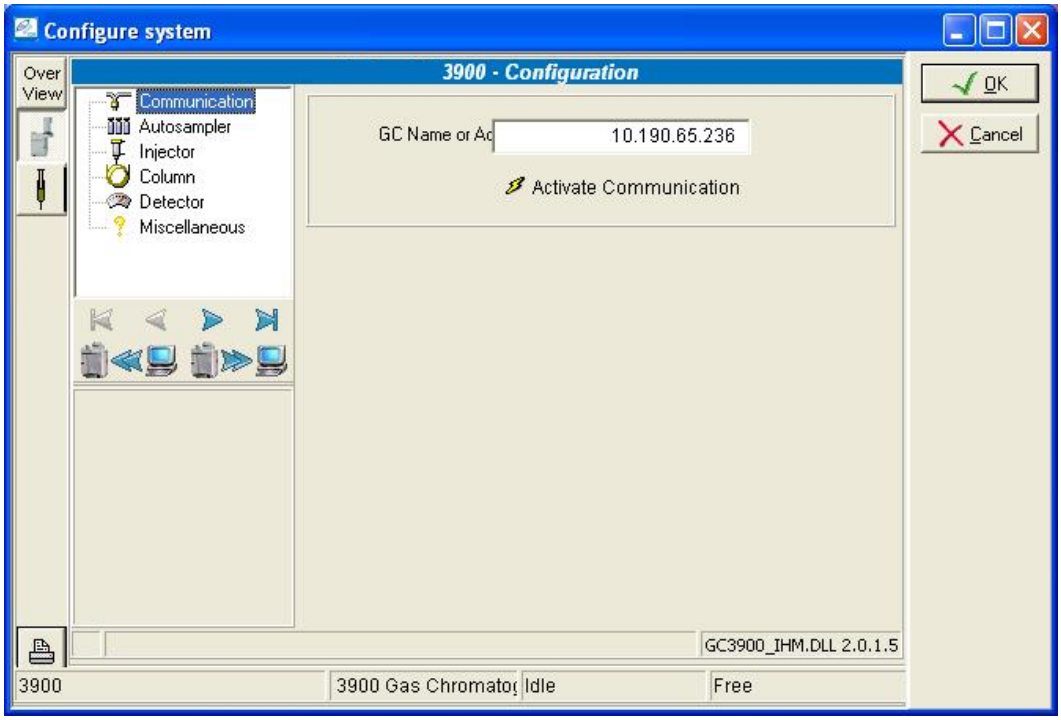
NOTE: The BOOTP server provided by CompassCDS is installed during the installation of the CompassCDS software.

Configuring the Driver

The driver software configuration is done in the CompassCDS Configuration Manager when a new chromatographic system is created.

Configuring the 3900 GC

Click on the button corresponding to the 3900 GC driver and the GC configuration screens appear:



The toolbar allows you to easily scroll through the configuration windows:

to select the first configuration window.

to select the previous configuration window.

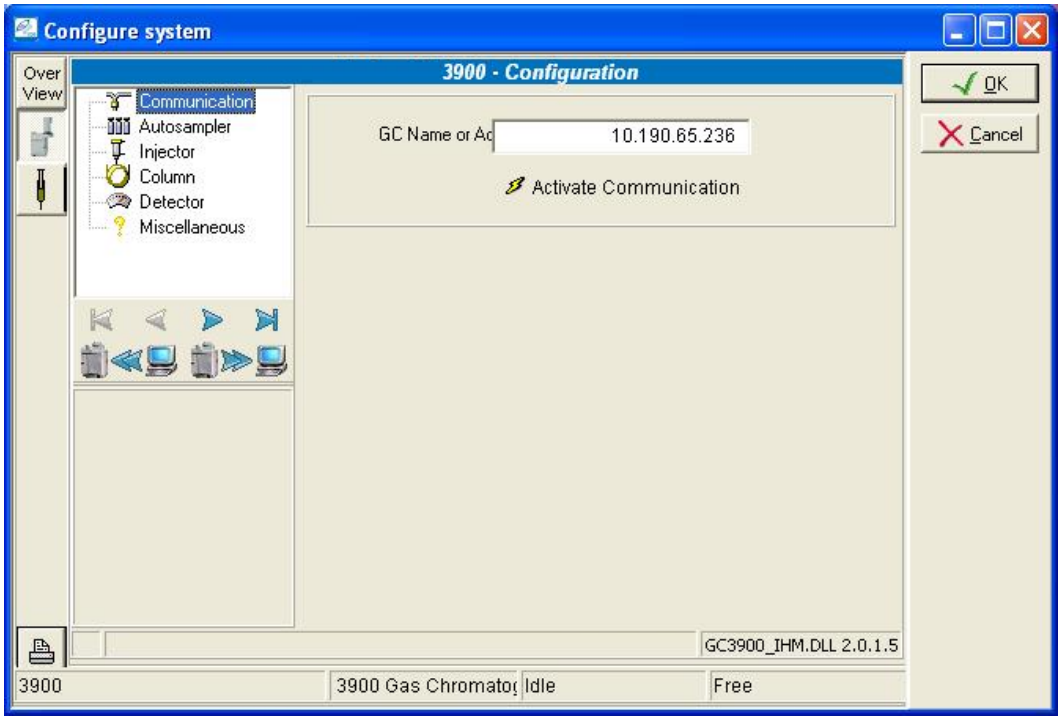
to select the next configuration window.

to select the final configuration window.

to send the configuration to the instrument.

to receive the configuration from the instrument.

Communication Window

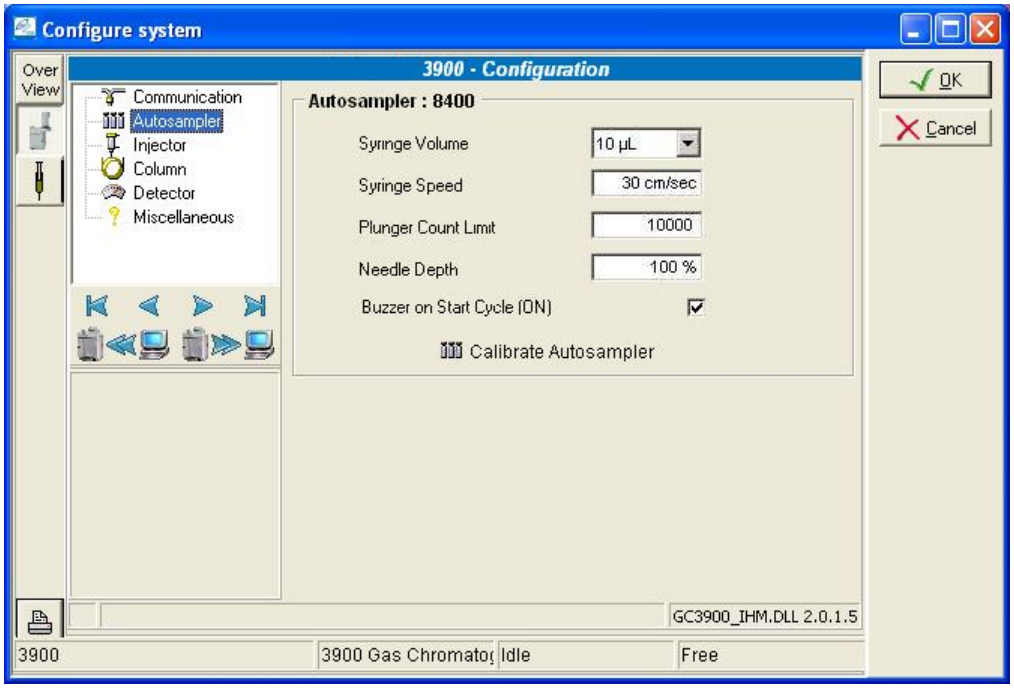


Enter the IP address of the 3900 (declared in the BOOTP Server) in the GC Name or Address field or click on the button to find the instrument previously declared with the BOOTP Server program and select it.

Press the

button to automatically get the configuration from the instrument.

Autosampler Window



Select volume (5, 10 or 100 µL) of the syringe you will install. The 3900 will use this value to set the correct entry selections and any needed internal setting to correctly use the indicated syringe size.

Enter the Syringe Speed (1 to 30 cm/sec, default = 30) in the corresponding field. The injector injection speed parameters define the rate at which the needle will penetrate the injector septum and descend to the set injector needle depth.

Enter the Plunger Count Limit (0 to 100 000, default = 10000): this parameter defines the number of strokes the plunger is expected to survive without significant degradation. Once the entered value is exceeded, a message will be displayed on the GC autosampler status, indicating the plunger counter has exceeded the set value.

Enter the Needle Depth (0 to 100%, default = 100) in the corresponding field. This parameter defines how far the needle will penetrate into the designated injector. 100 % causes the needle to be completely inserted to its 2-inch length.

Check the Buzzer on Start Cycle option to enable the buzzer: a sound will be generated to warn of impending tower movements when this parameter is set to On (default value).

Press the

button to calibrate the autosampler.

NOTE: The autosampler type is automatically detected by the CompassCDS driver.

Autosampler Calibration

If your 3900 GC is not equipped with a keypad, the calibration will be performed using the CompassCDS Configuration Manager. The goal of the calibration procedure is to align the autosampler needle with the first vial and with the injector.

NOTE: One basic rule associated with the calibration concerns rotation of the tower and carousel; to assure consistent operation, always approach the final calibration position with clockwise movements. To help facilitate this rule, the carousel will back up 10 steps when a counterclockwise action is selected but will move one step when a clockwise action is selected.

Vial Calibration:

1. To start the vial 0 (or vial 1 if 8410) calibration, make sure a vial with the same form factor and cap as the ones you will be using for your analyses is placed in the 0 position of the carousel (or the vial 1 position for the 8410).

2. Press the Start Calibration (F1) button (or the F1 key) in the *Calibrate Vial 0* (or *1*) *Position* field.

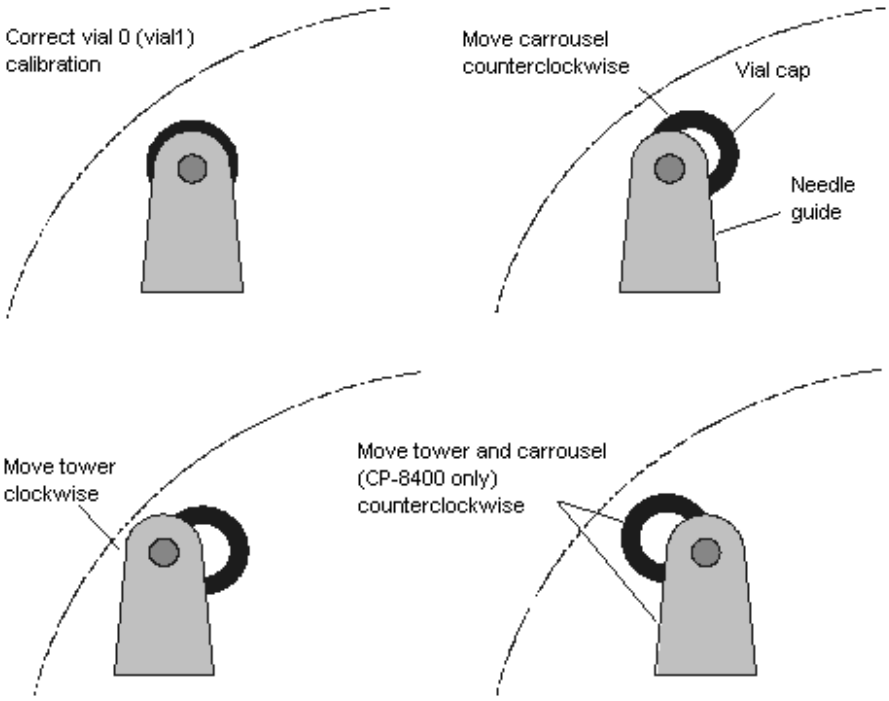
   Calibrating the vial 0 (or vial 1 if 8410) position involves manipulating the positions of three different components. The object of the calibration is to position the needle as closely as possible over the center of the sampling target area of the vial. Upon starting the calibration procedure, the 8400/8410 will rotate the tower, rotate the carousel (on the 8400 only), and lower the syringe sled to the approximate location of vial 0 (or vial 1).

3. After the 8400/8410 has found the approximate vial 0 (or vial 1) position and before going further, visually check that the syringe sled is not resting on the vial top. If it is, use the following buttons, in the *Moving Tower / Syringe* section, to move the sled so that the needle guide is approximately 1 mm above the vial:

   to move the syringe up.

   to move the syringe down.

4. Start the calibration process by adjusting the tower position as shown below:



Tower Position Calibration

5. Use the following buttons, in the *Moving Tower / Syringe* section, to adjust tower position:

   to move the tower 1 step in the clockwise direction each time the button is pressed.

   to move the tower 10 steps in the counterclockwise direction each time the button is pressed.

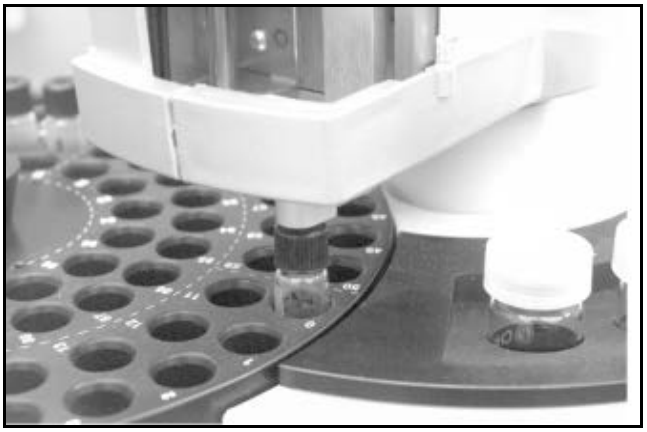
6. Next, for 8400 users only, set the carousel position. Use the following buttons, in the *Moving Carousel* section, to adjust carousel position:

   to move the carousel 1 step in the clockwise direction each time the button is pressed.

   to move the carousel 10 steps in the counterclockwise direction each time the button is pressed.

7. Finally, adjust the Syringe sled height so that the needle guide is just barely above the vial cap. You should be able to see about a paper thickness of space between the needle guide and the top of the vial cap. The penetration depth into the vial is measured from the bottom of the needle guide, so this height will give you optimum penetration depth.

When the Vial 0/Vial 1 calibration is correctly set, the needle guide should be positioned over the vial top as shown below.



Correct Vial Calibration

Press the Save Calibration (F2) button (or the F2 key) in the Calibrate Vial 0 (or 1) Position field, to complete the calibration of the vial or press the button to cancel calibration: the autosampler will recover its initial position.

Injector Calibration:

After completing the vial position calibration you will need to calibrate the injector position.

1. Press the Start Calibration (F3) button (or the F3 key) in the *Calibrate Injector Position* field.

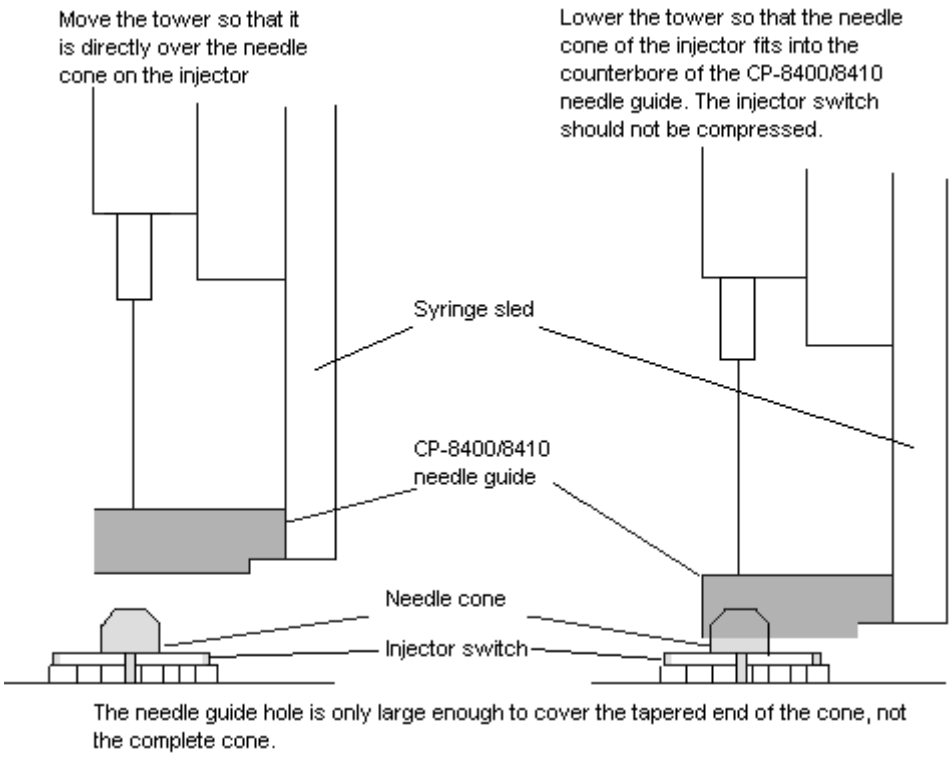
   The syringe tower will rotate so that it is approximately over the injector and the syringe sled will descend to a point near the top of the injector.

Use the following buttons, in the Moving Tower / Syringe section, to adjust the syringe position:

to move the syringe up.

to move the syringe down.

The needle guide should just cover but not depress the cone on the inject switch as shown below:


Move the tower so that it is directly over the needle cone on the injector
Lower the tower so that the needle cone of the injector fits into the counterbore of the CP-8400/8410 needle guide. The injector switch should not be compressed.
Syringe sled
CP-8400/8410 needle guide
Needle cone
Injector switch
The needle guide hole is only large enough to cover the tapered end of the cone, not the complete cone.

Correct Syringe Sled / Injector Position

2. Move the tower so that it is directly over the needle cone on the injector. Lower the tower so that the needle cone of the injector fits into the counter bore of the 8400/8410 needle guide.

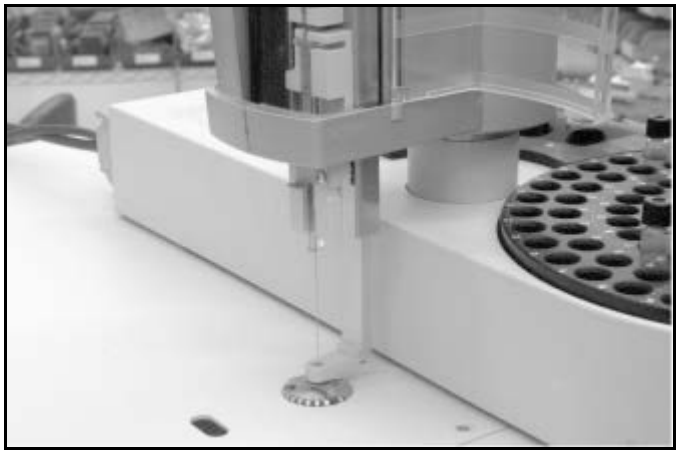
Use the following buttons, in the Moving Tower/Syringe section, to adjust tower position:

to move the tower 1 step in the clockwise direction each time the button is pressed.

to move the tower 10 steps in the counterclockwise direction each time the button is pressed.

NOTE: The injector switch should not be compressed. If the injector switch is compressed, you may experience ‘syringe sled’ errors during autosampler operation. If you are uncertain whether the inject switch is compressing, it is better to raise the syringe sled 1 or 2 steps.

When you have completed the tower and sled movements, the system should look as in the figure below:



Correct Injector Calibration

3. Press the Save Calibration (F4) button (or the F4 key) in the *Calibrate Injector Position* field, to complete the calibration of the injector or press the button to cancel calibration: the autosampler will recover its initial position.

4. Press the Done button to exit the autosampler calibration screen.

Using the keyboard to adjust positions

The positions of the tower, the syringe or the carousel can also be adjusted by using the following keys:

Tower / Syringe movement

equivalent to the up arrow key.

equivalent to the down arrow key.

equivalent to the left arrow key.

equivalent to the right arrow key.

equivalent to the home key.

Carousel movement

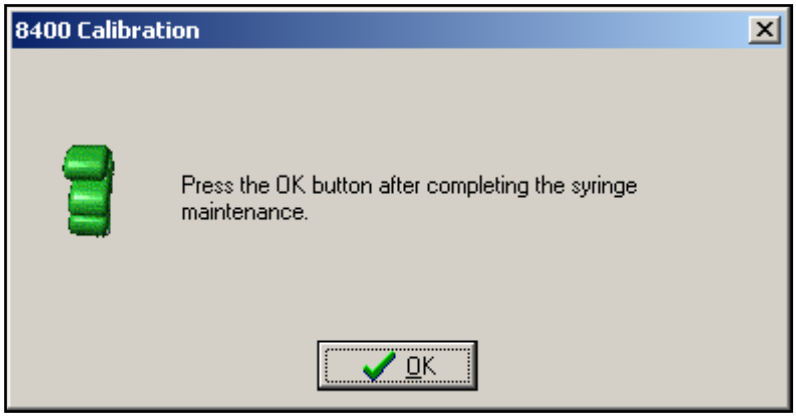
equivalent to the page up key.

equivalent to the page down key.

Syringe Maintenance

1. Press the Change Syringe (F5) button (or the F5 key): the tower will rotate so as you will have easy access to the syringe (for routine service, syringe removal and replacement…). The buzzer will sound before any tower movement occurs.

2. When the syringe has been changed, press the *OK* button in the following message screen:



3. The tower will return to its previous position and state. The buzzer will sound prior to movement as designated by the Buzzer on Start Cycle setting.

4. Press the Clear Plunger Count (F6) button (or the F6 key) to reset the plunger stroke count to 0. The following warning message appears:

Validate or cancel the operation by clicking on Yes or No.

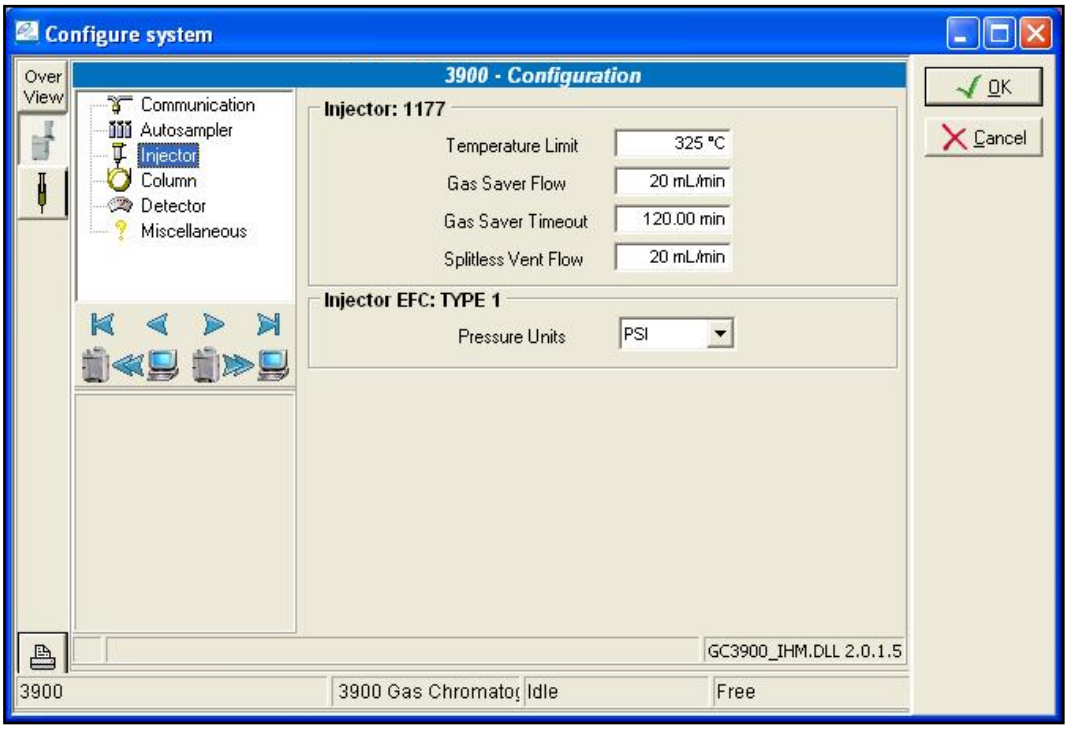
5. Press the Done button to exit the autosampler calibration screen.

Injector Window

1177 Injector

According to the 3900 GC model (with or without a keypad), information in this screen is different.

In case of a chromatograph with a keypad, the following screen is displayed:



Injector Parameter Group

Enter the upper temperature limit of the injector in the Temperature Limit field (50 to 450 °C).

Enter the lowest system flow rate that will be maintained during the gas saver period in the Gas Saver Flow field (1 to 100 mL/min, default = 20).

Enter the Gas Saver Timeout in the corresponding field [0 (Off) to 999.99 min]. A non-zero value entered for this parameter will cause the system to initiate a timer once a method is activated. If no system actions such as a run start or another method activation occurs before the gas saver timeout is reached, then the system will reduce the flow through the system to the gas saver flow. A method activation action will clear the gas saver flow and bring the system to Ready for subsequent injections.

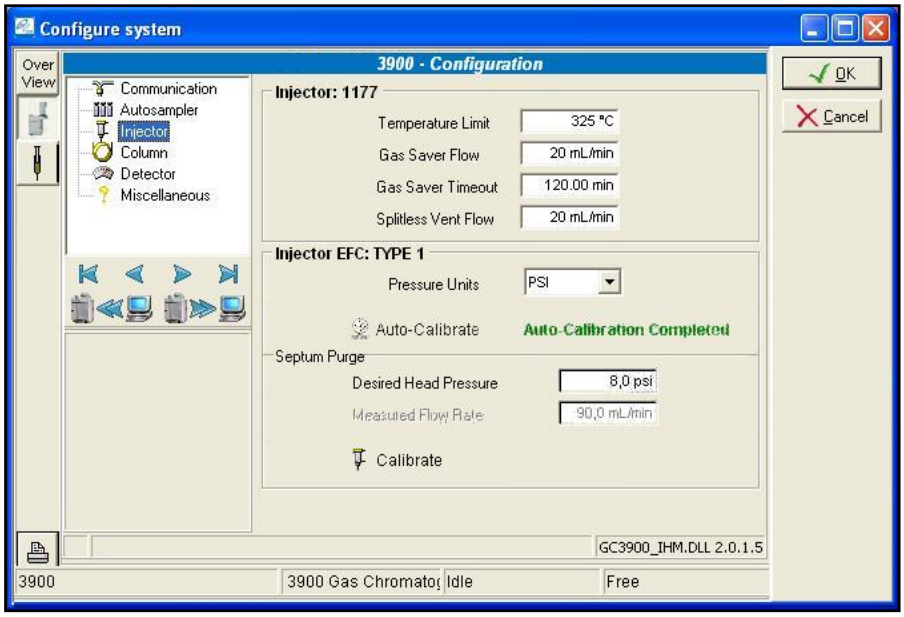
A zero value entered for the gas saver timeout will cause the gas saver flow to be ignored and no gas saver actions will be performed.

Define the Splitless Vent Flow (0 to 500 mL/min) which corresponds to the flow the system will vent when the split valve is left closed for the duration of the run. This flow is diverted before the injector and thus does not influence the splitless nature of the run. This entry is ignored during split and splitless runs in which the split vent is opened.

Injector EFC Type 1 Parameter Group

Select from the list the Pressure Units of the injector EFC (Electronic Flow Control). Three choices are available: PSI, kPa, Bar.

In case of a chromatograph without a keypad, the following screen is displayed:



Parameters are the same that for a chromatograph with a keypad, plus an Auto-Calibrate button and a Septum Purge part.

Click on the Auto-Calibrate button to automatically calibrate the EFC system.

When it is finished, a successful completion or detected problem message is displayed.

No other GC functions can be performed during Autocalibration.

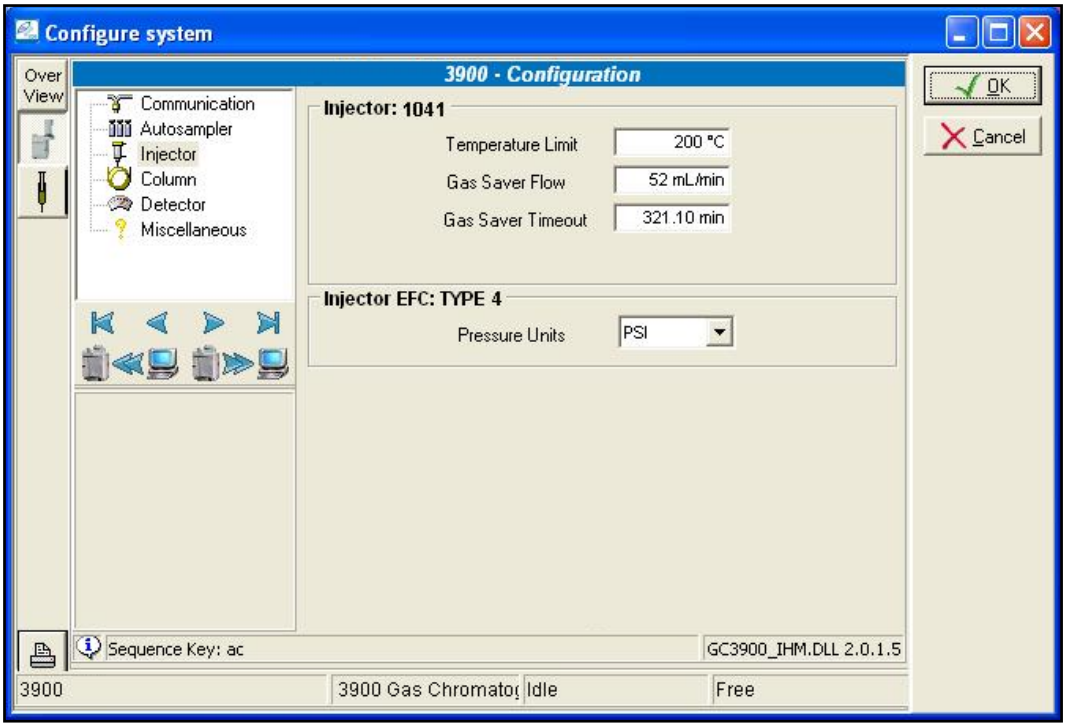
To calibrate the Septum Purge flow, perform the following steps:

1. Type the pressure in the Desired Head Pressure field.
2. Click on the Calibrate button.
3. Using a flow meter, measure the septum purge flow rate and type it in the Measured Flow Rate field.
4. Click on the Calibrate button.

NOTE: After installing a new column, the septum purge should be calibrated.

NOTE: The septum purge flow rate is adjustable but is typically set at 3-5 mL/min.

1041 Injector



Injector Parameter Group

Enter the upper temperature limit of the injector in the Temperature Limit field (50 to 450 °C).

Enter the lowest system flow rate that will be maintained during the gas saver period in the Gas Saver Flow field (1 to 100 mL/min, default = 20).

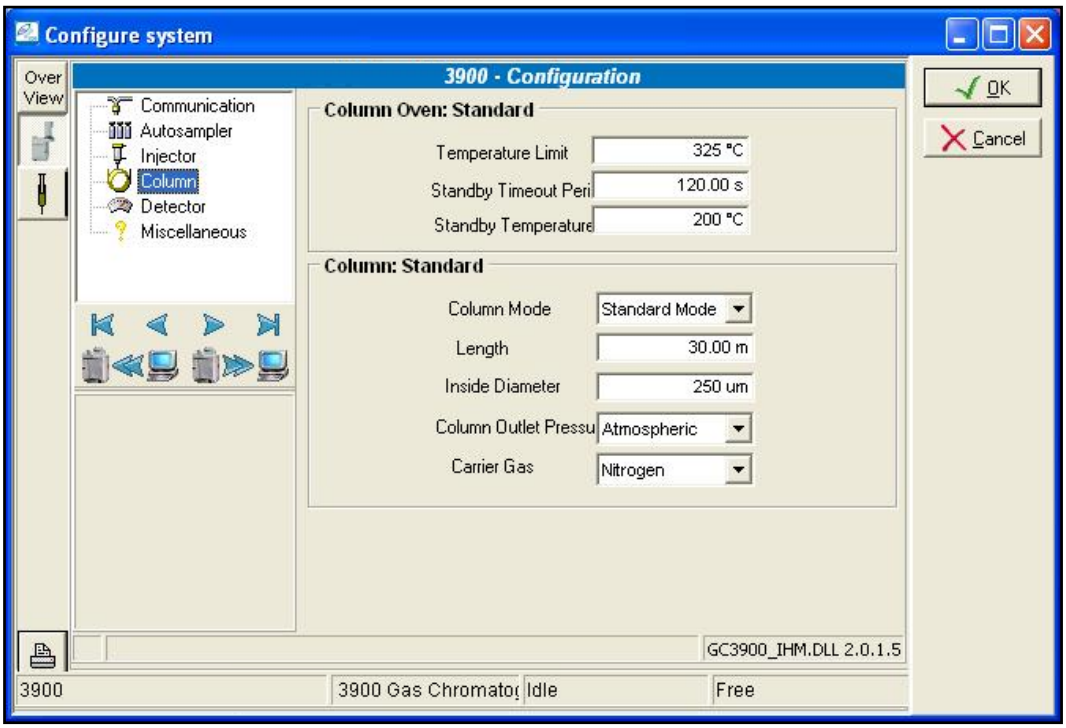
Enter the Gas Saver Timeout in the corresponding field (0 -Off- to 999.99 min). A non-zero value entered for this parameter will cause the system to initiate a timer once a method is activated. If no system actions such as a run start or another method activation occurs before the gas saver timeout is reached, then the system will reduce the flow through the system to the gas saver flow. A method activation action will clear the gas saver flow and bring the system to Ready for subsequent injections.

A zero value entered for the gas saver timeout will cause the gas saver flow to be ignored and no gas saver actions will be performed.

Injector EFC Type 4 Parameter Group

Select from the list the Pressure Units of the injector EFC (Electronic Flow Control). Three choices are available: Psi, kPa, bar.

Column Window



Column Oven Parameter Group

Enter the upper Temperature Limit of the column oven in the corresponding field (50 to 450 °C).

Enter the Standby Timeout Period in the corresponding field (0 to 999 min).

Enter the Standby Temperature in the corresponding field (30 to 250°C).

When the Column Standby Temperature is enabled, the GC will be held Not Ready until Reset is pressed on the instrument or the Standby Temperature is disabled.

Column Parameter Group

Select the required Column Mode. Two choices are proposed: Standard Mode (by default) or Rapid MS Mode. Rapid MS Mode is only applicable to a Rapid MS column used in a 2100 GC/MS system.

Enter the column Length (0 to 250 m) and Inside Diameter (0 to 999 µm) in the corresponding fields.

Select from the list the Column Outlet Pressure (Atmospheric or Vacuum – for MS detectors).

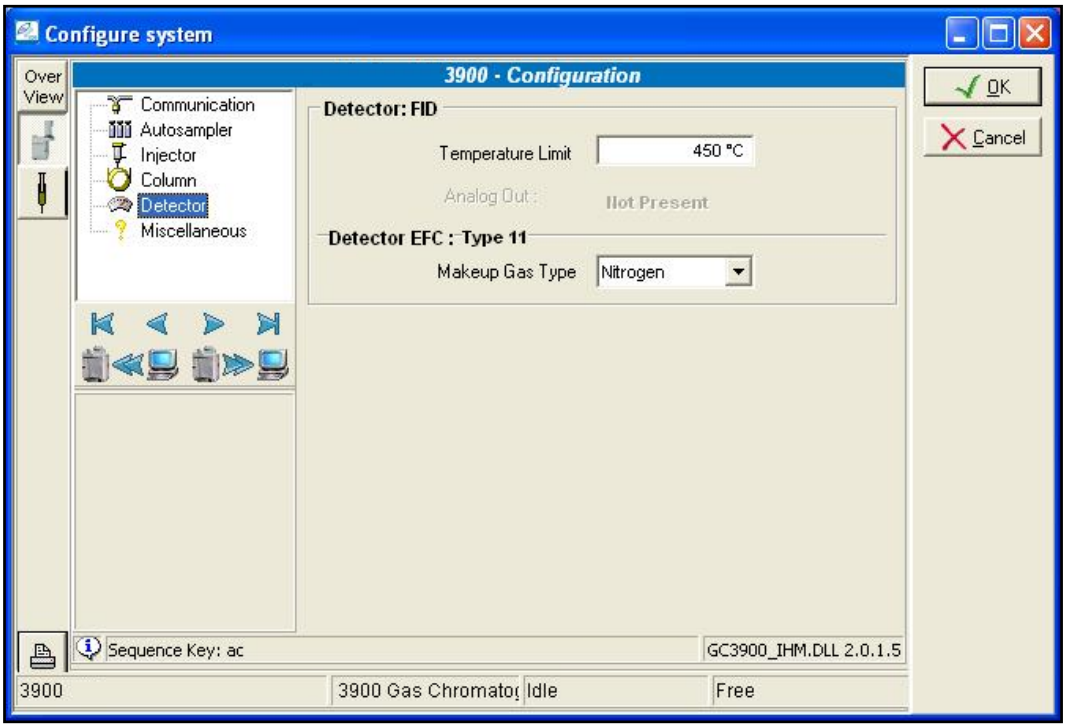
Select the Carrier Gas from the list. The following choices are available: Helium, Hydrogen, and Nitrogen.

Detector Window

FID Detector

According to the 3900 GC model (with or without a keypad), information in this screen is different:

In case of a chromatograph with a keypad, the following screen is displayed:



Detector Parameter Group

Enter the upper Temperature Limit of the detector in the corresponding field (50 to 450 °C).

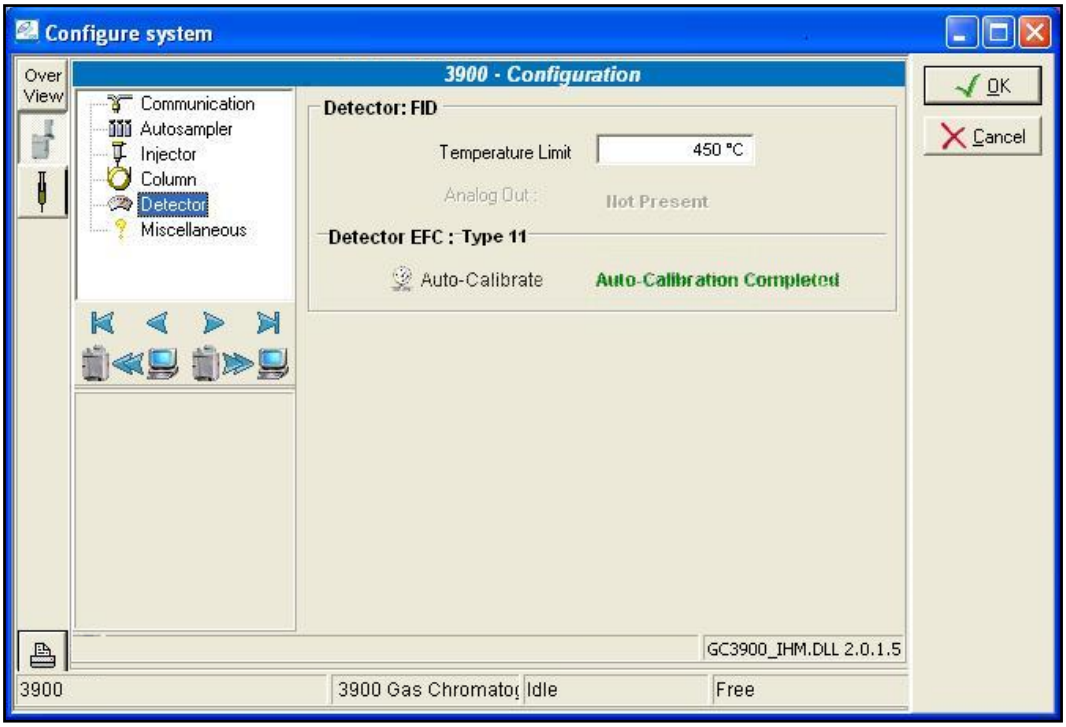
If the Analog Output is configured on the GC, the corresponding field is active and Present is displayed.

Detector EFC Parameter

For FID detectors, the EFC Type 11 is required.

Select the Makeup Gas Type from the list. Three choices are available: Helium, Nitrogen and Argon.

In case of a chromatograph without a keypad, the following screen is displayed:



Parameters are the same that for a chromatograph with a keypad, plus an Auto-Calibrate button.

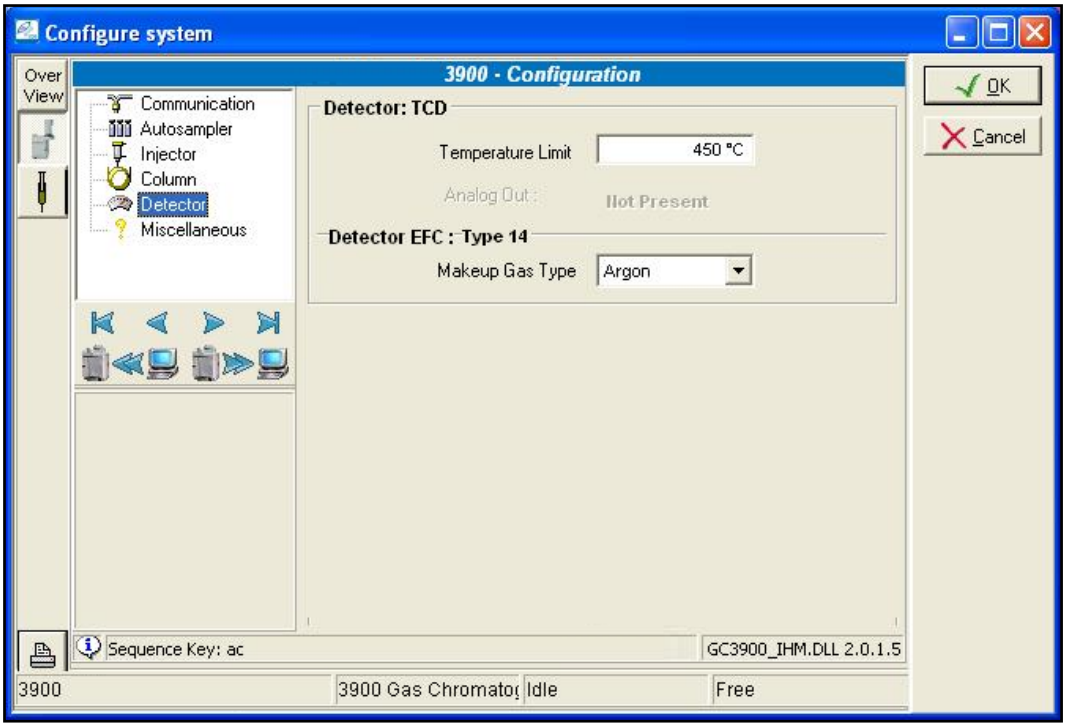
Click on the Auto-Calibrate button to automatically calibrate the EFC system.

When it is finished, a successful completion or detected problem message is displayed.

No other GC functions can be performed during Autocalibration.

NOTE: Autocalibration should be done on a semiannual basis.

TCD Detector



Detector Parameter Group

Enter the upper Temperature Limit of the detector in the corresponding field (50 to 450 °C).

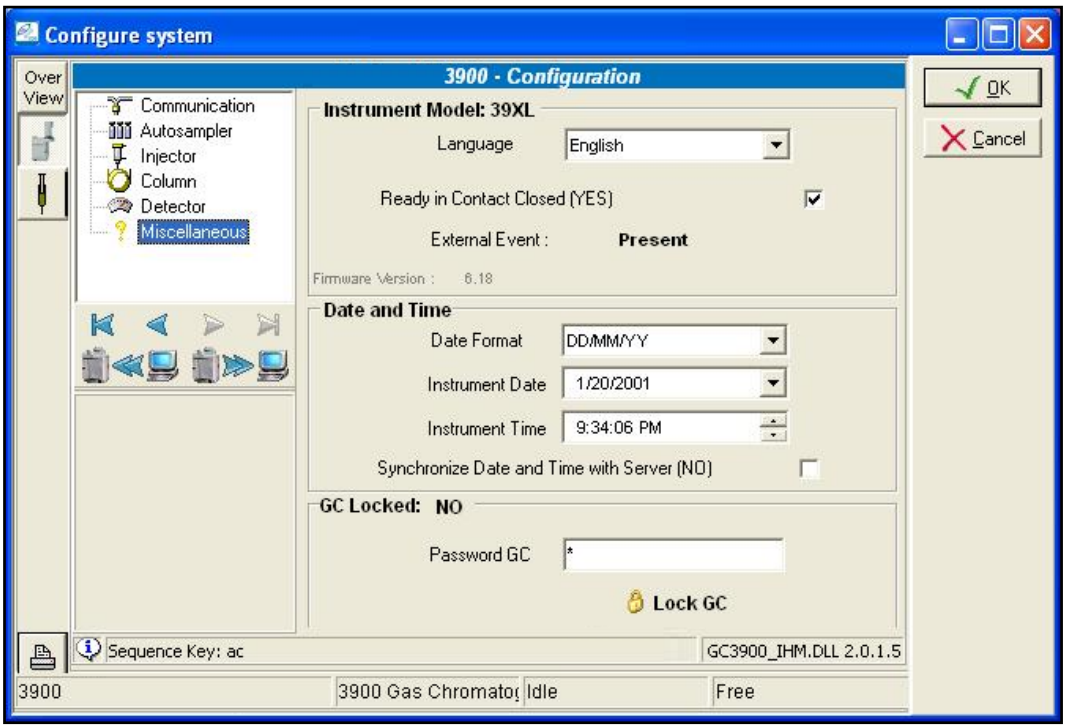
If the Analog Output is configured on the GC, the corresponding field is active and Present is displayed.

Detector EFC Parameter

For TCD detectors, the EFC type 14 is required.

Select the Makeup Gas Type from the list. Three choices are available: Helium, Nitrogen and Argon.

Miscellaneous Window



Instrument Model Parameter Group

Select the Language of the instrument. Here are the available choices: English, French, Italian, Spanish, German, Katakana (Japanese).

The Ready in Contact Closed option allows you to specify what switch state corresponds to external device Ready. Check the option if the closed state means Ready.

The presence of External Events is also displayed in this screen.

Date and Time Parameter Group

This section allows you to select the Date Format (MM/DD/YY or DD/MM/YY), the Instrument Date and Instrument Time and to choose whether or not to synchronize GC date and time with the server.

GC Locked Parameter Group

To lock or unlock the GC type the password in the password GC field and press the button Lock GC or Unlock GC.

If the GC is locked by a password before CompassCDS takes control of the GC, no method can be downloaded in the GC if the password is not specified in the password GC field.

Configuring the Synopsis

In the Overview part of the system configuration, a synopsis can be defined for the system. This synopsis depends on the configured devices.

To save the configuration of these devices, click on the OK button.

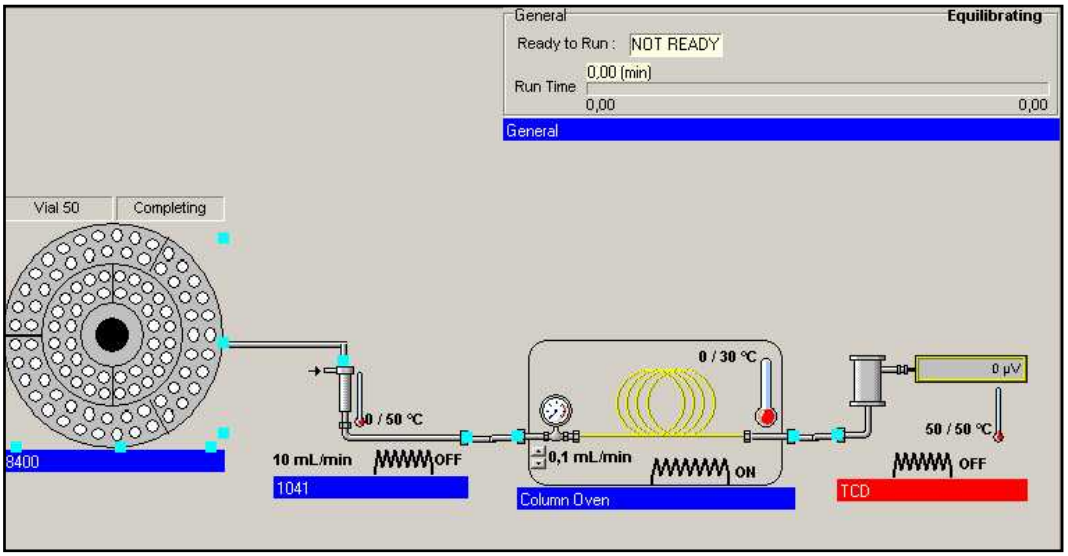
Right click on the system name in the bottom part of the CompassCDS Configuration Manager screen. A pop-up menu appears: click on Stop. Then right click on the system name again, and click on Start.

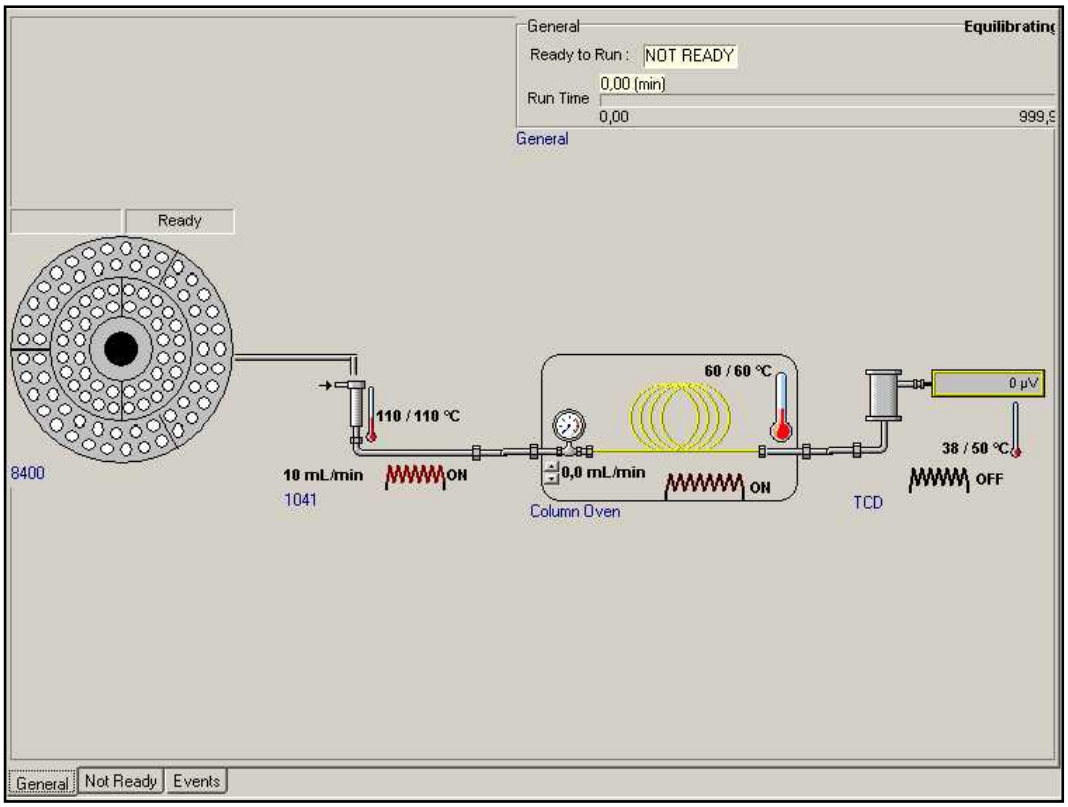
Go back to the System Configuration screen (Properties wizard). A graphic of the devices that comprise the system is displayed in the synopsis screen. To configure the synopsis as the real instrument configuration, move each module, then connect it appropriately. To do this, select one anchor for each of the two modules (the selected anchors become red) and click on the button; a connection tube will appear between the two anchors.

Click on the to delete a selected tube; click on the button to delete all the tubes.
Click on to define a background color, or on to make the background transparent.
Click on the icon to change the grid color.

Once the synopsis configuration is complete, it will be displayed in CompassCDS, in the Systems tab. In this tab, the Overview will show the synopsis of the system with some parameters displayed (temperature, flow, signal, etc.), depending on the installed devices.

For example, the following pictures represent the synopsis of the 3900 GC:





NOTE: Once the system has been created and correctly configured, it must be associated to one or more projects in order to start some acquisitions. For more details about the creation and configuration of a system, refer to the CompassCDS Configuration Manager User Guide.

Press the button to print the current 3900 GC configuration.

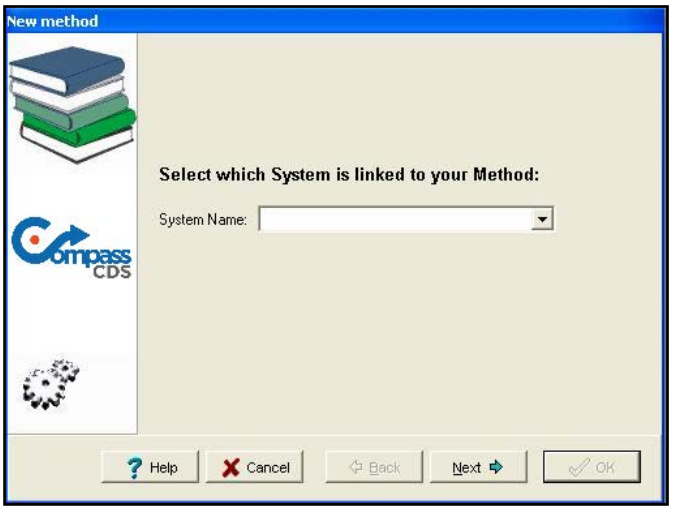
Building a Method

Creating a New Method

The method contains parameters for instrument control, data acquisition, chromatogram processing, and editing of final results. To initially set up a method, it is not necessary to define all of the sub-method sections; however, you must fill in the instrument control section prior to starting an acquisition.

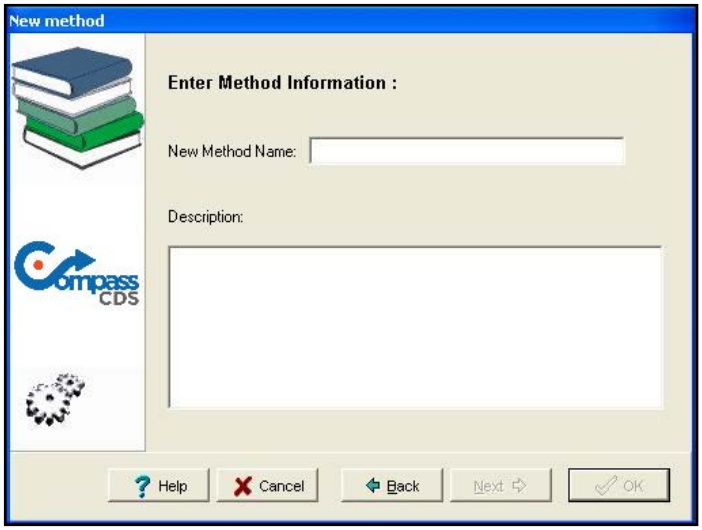
To create a new method, select the FILE / NEW METHOD option from CompassCDS main menu.

A wizard guide will appear and provide assistance during the first steps of method creation:



Choose the system (chromatograph) associated with the method. A method is created for a particular system. When starting an acquisition, the name of the system that performs the acquisition must be correct, since method access is limited only to those methods associated with this system.

Once this field is completed, click on the Next button to move to the second step of the method creation:



Enter the New Method Name in the first field. In the Description field, enter information concerning the method (optional).

Once these two fields have been completed, click on the OK button. The new method is created and is opened with default parameters in the CompassCDS Chromatography Data System. The next step is the definition of each of the method sections.

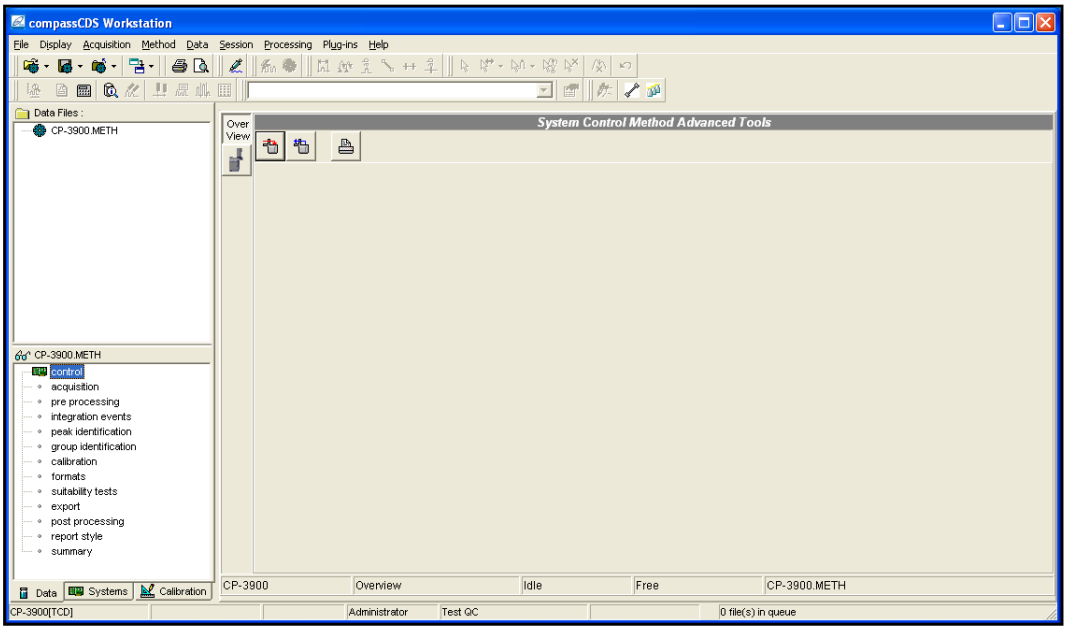
The instrument control section must be defined to start an acquisition. In the following part of this guide, only the control section of the method for the 3900 GC is detailed. Other parameters such as Injection Volume, Vial, and Rack number may be necessary and are defined in the acquisition section.

NOTE: For more details about the programming of each method section, refer to CompassCDS User Guide.

Control Method Section for the 3900 GC

Once the new method is created, select the control section in the lower part of the browser.

The following screen appears:



Press the Over View button to display the System Control Method Advanced Tools window:

to send the current method to the instrument

to get the active method from the instrument

to print the current method

Click on the button to display the 3900 control method section. It contains seven sub-sections: Autosampler, Injector, Oven, Column Pneumatics, Detector, External Events, and Miscellaneous. Click on the required sub-section to define the corresponding parameters that will be used during the chromatographic run.

The toolbar allows you to easily scroll through the control method windows:

to select the first window of the control method.

to select the first window of the control method.

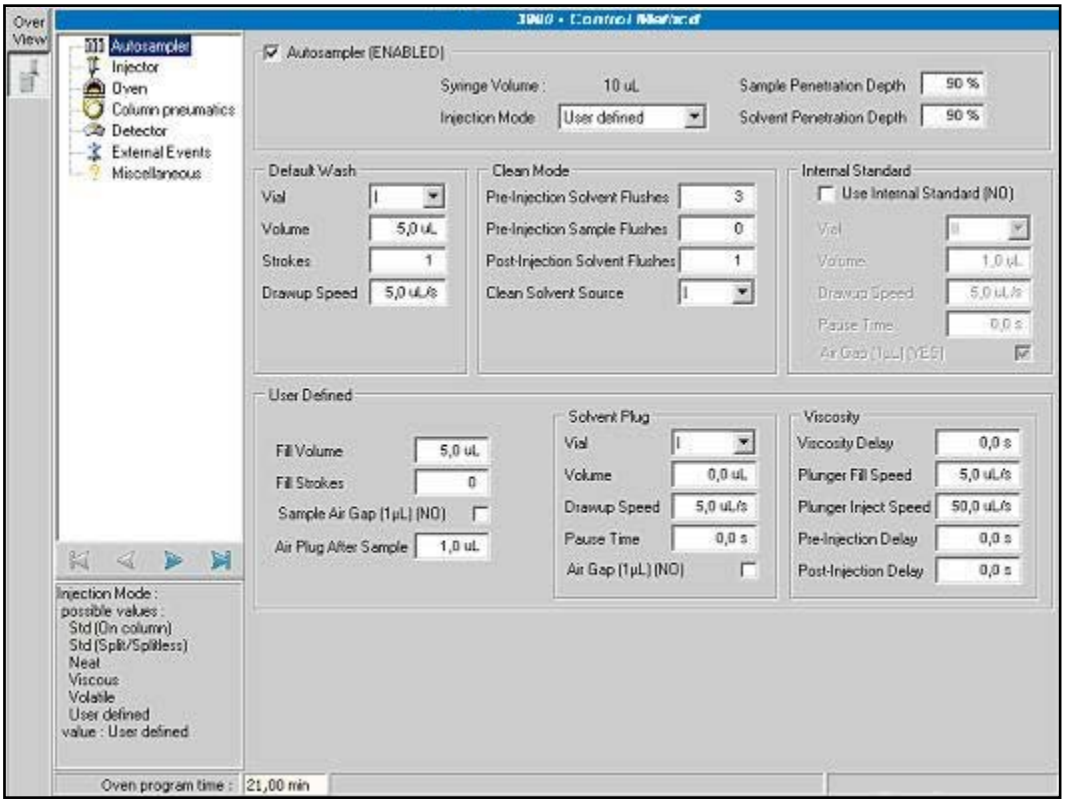
to select the first window of the control method.

to select the final window of the control method.

NOTE: The browser always displays the current end time of the column oven program. If you enter program end times for components other than the column oven that exceed the column oven end time, a warning message will be displayed. The column oven end time determines the method end time. As a consequence, when the method is downloaded to the GC, component program end times that exceed the column oven end time will be truncated.

Autosampler Control

The autosampler window contains sampling parameters for the 8400/8410 Autosampler when attached to the 3900 GC:



Autosampler Parameter Group

In this parameter group, define the sampling syringe size (Syringe Volume), the Injection Mode and the Penetration Depth for sample and solvent wash vials.

Parameter	Description
Autosampler	When unchecked, this option allows you to inject manually and to not use the autosampler (when unchecked, all the sampler parameters become non-active).
Syringe Volume (µL)	Selects the size of the syringe that is installed on the instrument.
Injection Mode	Consists of five predefined injection modes: Standard Split/Splitless, Standard On-Column, Neat, Viscous and Volatile. A sixth User Defined mode is available and allows you access to all autosampler parameters to fine-tune your injection.
Sample Penetration Depth (%)	Specifies how far the syringe needle is to go down into the sample vial. 100% corresponds to the bottom of the vial. 0% is the bottom of the vial septum.
Solvent Penetration Depth (%)	Specifies how far the syringe needle is to go down into the solvent vial. 100% corresponds to the bottom of the vial. 0% is the bottom of the vial septum.

NOTE:

The *standard* mode is the default and typically yields good results in most applications.

The *volatile* sampling mode is used for sampling solvents with high vapor pressures at room temperature.

The *neat sampling* mode is used for pure samples requiring minimum contamination with wash solvent (this mode does not use a solvent plug).

The *viscous sampling* mode is used for samples with a higher viscosity than water.

Default Wash Parameter Group

In the Default Wash fields, define the parameters that will be used during the default cleaning which is used in case automation is stopped or a serious fault is detected.

Parameter	Description
Vial	Specifies which of the three solvent vials will be used by the default cleaning.
Volume (µL)	Specifies the amount of cleaning solvent that will be drawn up with each syringe cleaning stroke.
Strokes	Specifies the number of times the cleaning solvent will be drawn up into the syringe and expelled into the waste cup.
Drawup Speed (µL/s)	Specifies speed at which the cleaning solvent will be drawn up into the syringe and the speed at which it is expelled into the waste cup.

Clean Mode Parameter Group

In the Clean Mode fields, define the pre and post injection syringe clean modes.

Parameter	Description
Pre-Injection Solvent Flushes	Specifies the number of times each selected cleaning solvent will be drawn up into the syringe and expelled into the waste cup before flushing with next cleaning solvent (if more than one cleaning solvent source is specified) or the sample, before injection.
Pre-Injection Sample Flushes	Specifies the number of times the sample will be drawn up into the syringe and expelled into the waste cup before the syringe is loaded for injection.
Post-Injection Solvent Flushes	Specifies the number of times each selected cleaning solvent will be drawn up into the syringe and expelled into the waste cup before flushing with next cleaning solvent (if more than one cleaning solvent source is specified), after injection.
Clean Solvent Source	Selects which solvent vial or sequence of solvent vials will be used to flush the syringe before and after injection.

Internal Standard Parameter Group

The Internal Standard section is displayed when one of the following injection modes is selected: Viscous, Volatile or User-defined.

If the Use Internal Standard option is checked, an internal standard solution will be drawn up into the syringe from the specified solvent vial before the sample is drawn up.

Parameter	Description
Vial	Selects which solvent vial contains the internal standard.
Volume (µL)	Specifies the amount of internal standard to be drawn into the syringe before the sample.
Drawup Speed (µL/s)	Specifies the speed at which the internal standard will be drawn up into the syringe.
Pause Time	Defines how long the syringe is to remain in the internal standard vial after drawing up the internal standard.
Air Gap	When the option is checked, 1 µL of room air will be drawn into the syringe to create an air gap between the internal standard and the sample

NOTE: When this mode of injection is selected, beware that the total volume (volume of sample injected, entered in the Volume field of the Acquisition method section + Volume of internal standard + volume of any air gaps) does not exceed the maximum syringe volume or the autosampler will be faulted and the GC will stay in the Waiting for injection state.

User Defined Parameter Group

When the User Defined injection mode has been selected, another parameter group is displayed and allows you to define the general, Solvent Plug and Viscosity parameters:

User Defined Parameters

Parameter	Description
Fill Volume (µL)	Specifies the sample volume that will be used for each fill stroke.
Fill Strokes	Specifies the number of times the sample will be pumped in and out of the syringe before loading the sample volume into the syringe.
Sample Air Gap	When the option is checked, 1 µL of room air will be drawn into the syringe to create an air gap before the sample plug.
Air Plug After Sample	Specifies the volume of room air that will be drawn into the syringe after it is loaded with sample.

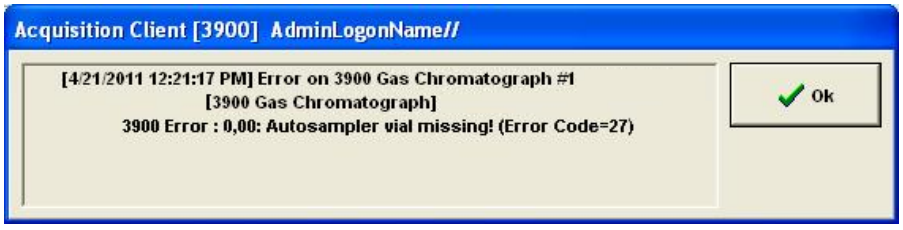
Solvent Plug Parameters

Parameter	Description
Vial	Selects which solvent vial to use for the solvent plug.
Volume (µL)	Specifies the amount of solvent to be drawn into the syringe before the sample or internal standard.
Drawup Speed (µL/s)	Specifies the speed at which the solvent will be drawn up into the syringe.
Pause Time	Defines how long the syringe is to remain in the solvent vial after drawing up the solvent.
Air Gap	When the option is checked, 1 µL of room air will be drawn into the syringe to create an air gap before the solvent plug.

Viscosity Parameters

Parameter	Description
Viscosity Delay (sec)	Specifies how long the syringe is to remain in the sample vial after drawing up the sample.
Plunger Fill Speed (µL/sec)	Specifies the speed at which the sample will be drawn up into the syringe.
Plunger Inject Speed (µL/sec)	Specifies the speed at which the contents of the syringe will be expelled into the injector.
Pre-Injection Delay (sec)	Specifies the length of time the syringe needle resides in the injector before expelling the syringe contents.
Post-Injection Delay (sec)	Specifies the length of time the syringe needle remains in the injector after expelling the syringe contents.

NOTE: When a vial is missing, the following message appears and you have 10 minutes to replace the sample in the correct vial position before the system skips the missing vial and passes to the next line of the sequence or stops the run. When you have replaced the missing sample, you must go to the *Systems* tab, click on the instrument icon, select the *Miscellaneous* tab and click on the Re-inject button to restart the run. If you want to skip the missing vial and start the next run, you must press the Skip vial button.


Acquisition Client [3900] AdminLogonName//
[4/21/2011 12:21:17 PM] Error on 3900 Gas Chromatograph #1
[3900 Gas Chromatograph]
3900 Error : 0,00: Autosampler vial missing! (Error Code=27)
Ok

Warning Message When a Vial is Missing.

Default Settings for Predefined Autosampler Mode

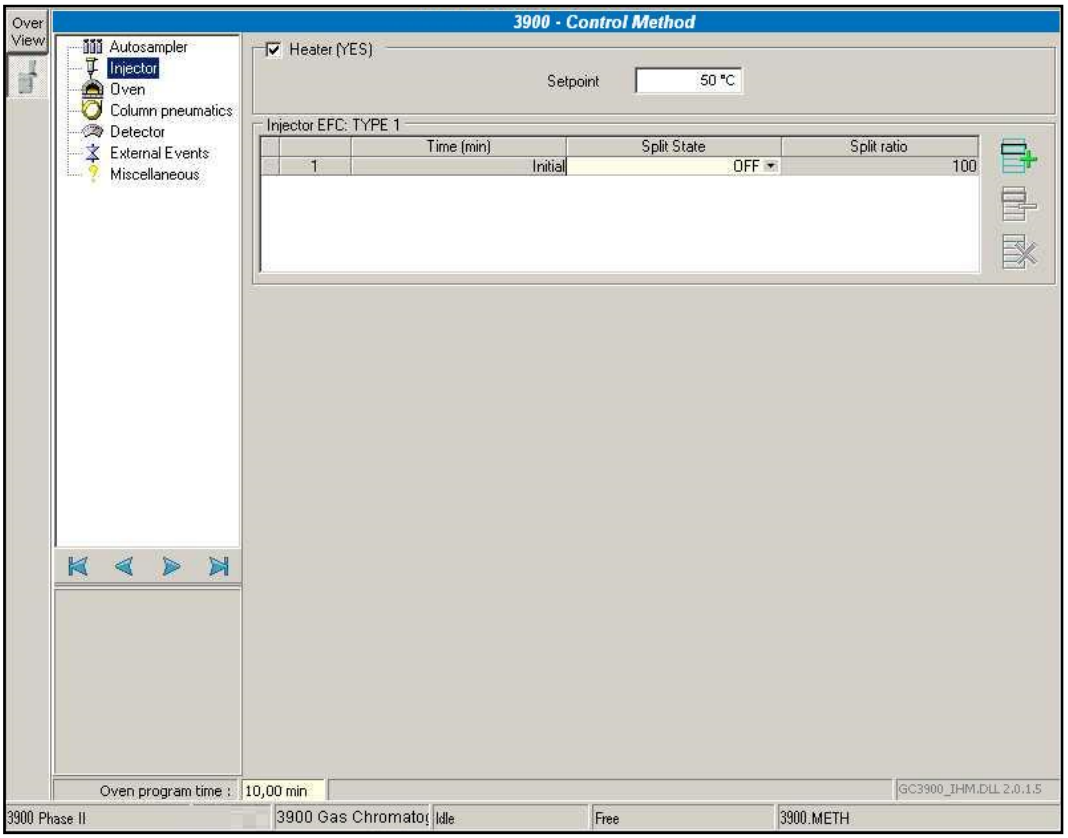
The following table lists the parameter settings used for each of the Predefined 8400/8410 modes using a 10 microliter syringe. If the predefined modes do not work acceptably for your samples, use the User Defined mode to enter settings that will work better with your samples. The values listed in this table provide a starting point for setting the various parameters.

Parameter	Std Split/ Splitless	Std On-Column	Neat*	Volatile	Viscous
Solvent Plug Settings:	Solvent plug is not used with predefined modes. If you wish to use solvent plug injections, you must use User Defined mode.				
Predefined Settings:					
Fill Volume	7.5 µL	7.5 µL	Not used	Not used	Not used
Fill Strokes	5	5	0 [1]	0	0
Sample Air Gap	No	No	No	No	No
	1 µL	1 µL	1 µL	1 µL	1 µL
Viscosity Settings:					
Delay	0 sec	0 sec	0 sec	6 sec	9.9 sec
Fill Speed	2 µL/sec	2 µL/sec	2 µL/sec	1 µL/sec	1 µL/sec
Inject Speed	50 µL/sec	2 µL/sec	50 µL/sec	1 µL/sec	5 µL/sec
Air Plug After Sample	0 sec	0 sec	0 sec	0 sec	0 sec
Post-Injection Delay	0 sec	6 sec	0 sec	0 sec	12 sec

[1] Instead of fill strokes, Neat mode fills the syringe with sample at 2 µL/sec then expels it into the waste cup at 50 µL/sec. It does this a total of six times. Then it fills the syringe with sample at 2 µL/sec and expels it back into the sample vial at 50 µL/sec. This “pumping” action is done three times. After this is completed, the sample is loaded into the syringe and injected using the parameters in the table.

Injector Control

1177 Injector



Check or uncheck the Heater option to turn the injector oven ON or OFF.

Enter the injector oven temperature in the Setpoint field (50 to 450 °C).

Injector EFC Parameter Group

If the injector is connected to a Type 1 EFC, you can build a split ratio time program by using the split event table:

The first row of the spreadsheet contains the Initial Split State and Split Ratio for the injector. The injector will equilibrate to this setting when the method is activated, and will be restored to this setting when each chromatographic run is completed.

The rest of the spreadsheet contains the time-programmed settings for the injector Split Ratio: The Split Valve will be switched to the ratio in each row at the indicated time. If the Split State is ON, then the sample is split according to the Split Ratio specified in the corresponding column. If the state is OFF, the entire sample enters the column.

The split ratio is defined as the column flow plus the split flow, divided by the column flow.

NOTE: You must have already configured the Type 1 EFC in the configuration manager (CompassCDS Configuration Manager) before you can program the split ratio. You can use a split ratio of 100 after injection to vent the injector of any residual solvent. Use a very low split ratio after flushing to conserve carrier gas.

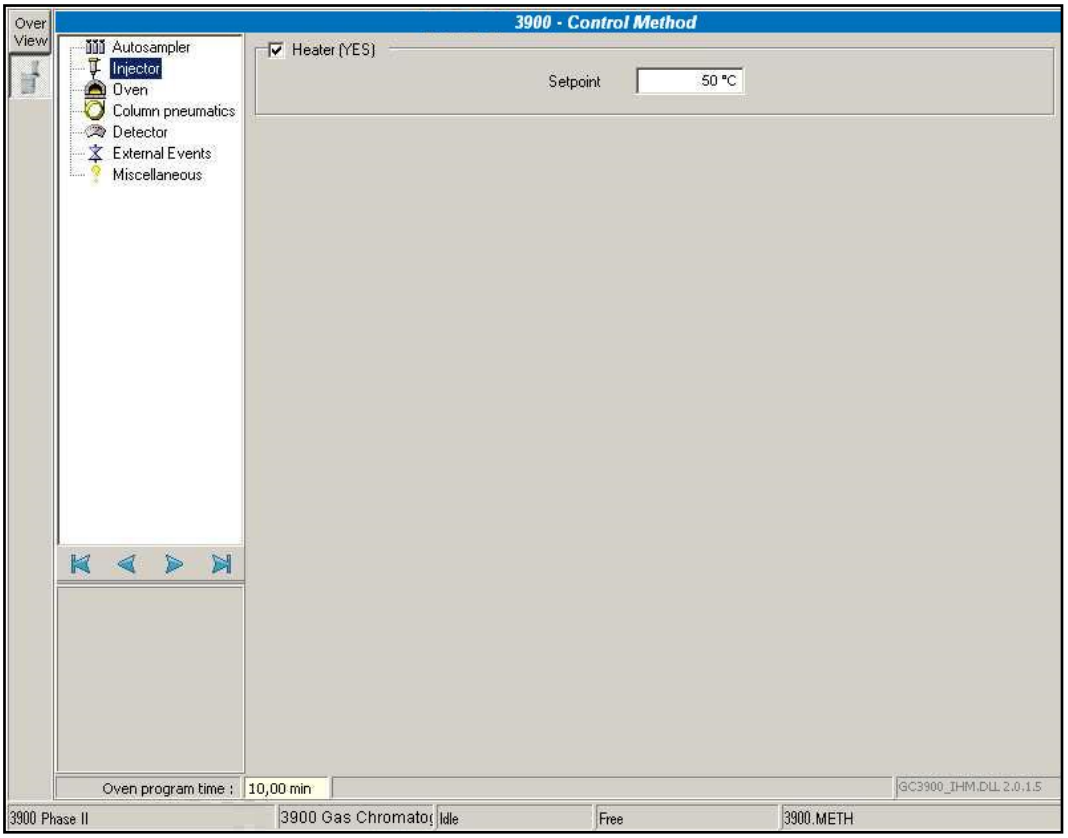
Use the following buttons to edit the table:

to add a line to the table.

to delete a line in the table.

to clear the entire table.

1041 Injector

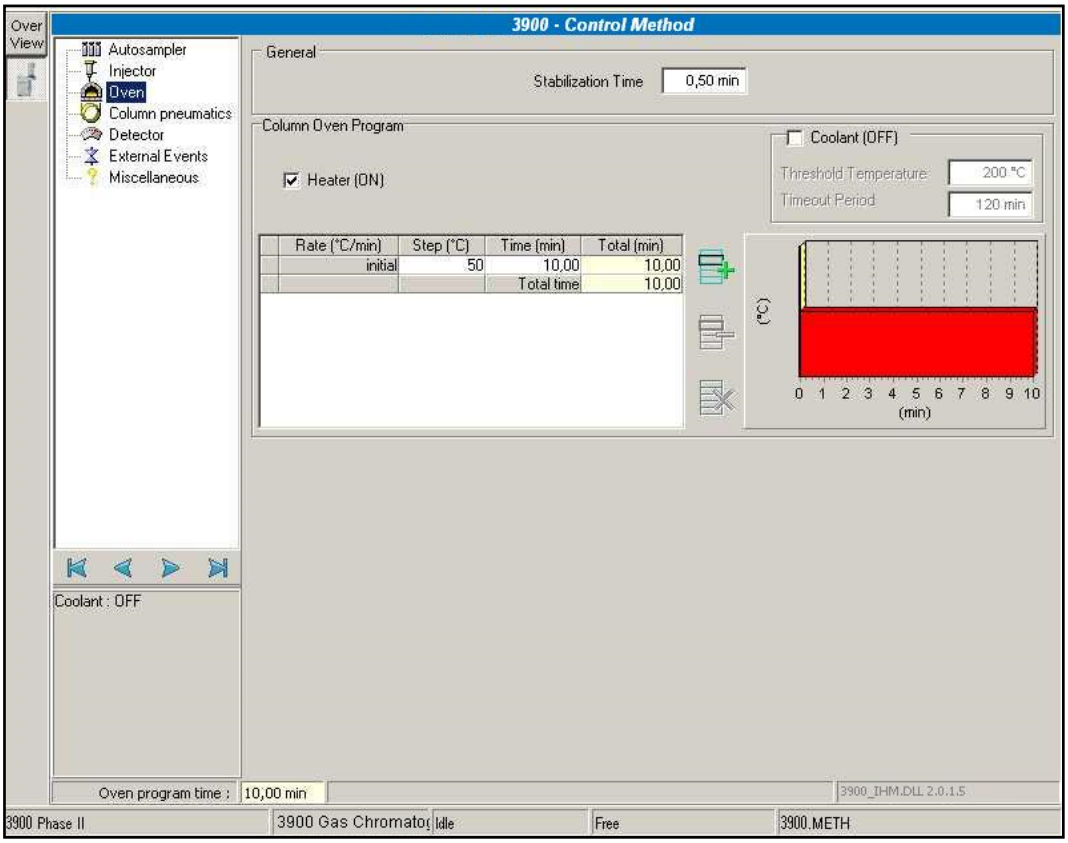


Check or uncheck the Heater option to turn the injector oven ON or OFF.

Enter the injector oven temperature in the Setpoint field (50 to 450 °C).

Column Oven Control

The Column oven window contains the column oven program:



General Parameter

Enter the Stabilization Time in the corresponding field (0.00 to 10.00 min).

Column Oven Program Parameter Group

Check or uncheck the Heater option to turn it ON or OFF.

Use the spreadsheet to build a temperature ramp program to heat and/or cool the column oven.

The first row of the spreadsheet contains the Initial temperature and hold time for the column oven. The column oven will equilibrate to this setting and stabilize for the specified Stabilization Time (defined in the General field), when the method is activated, and will be restored to this setting when each chromatographic run is completed. The rest of the spreadsheet contains the programmed settings for each of the ramp segments. Enter the final temperature of each ramp segment in the Step column (30 to 450 °C), the Rate (0.1 to 100.0 °C/min) and the Time (0.00 to 999.99 min) the column oven is held at this temperature in the corresponding columns.

Use the following buttons to edit the table:

to add a line to the table.

to delete a line in the table.

to clear the entire table.

The graph shows the column oven temperature program.

Check the Coolant option if you want to turn the column coolant valve ON. Specify the temperature for the coolant valve to turn on in the Threshold Temperature field (50 to 250°C) and the Timeout Period (0 to 999 min).

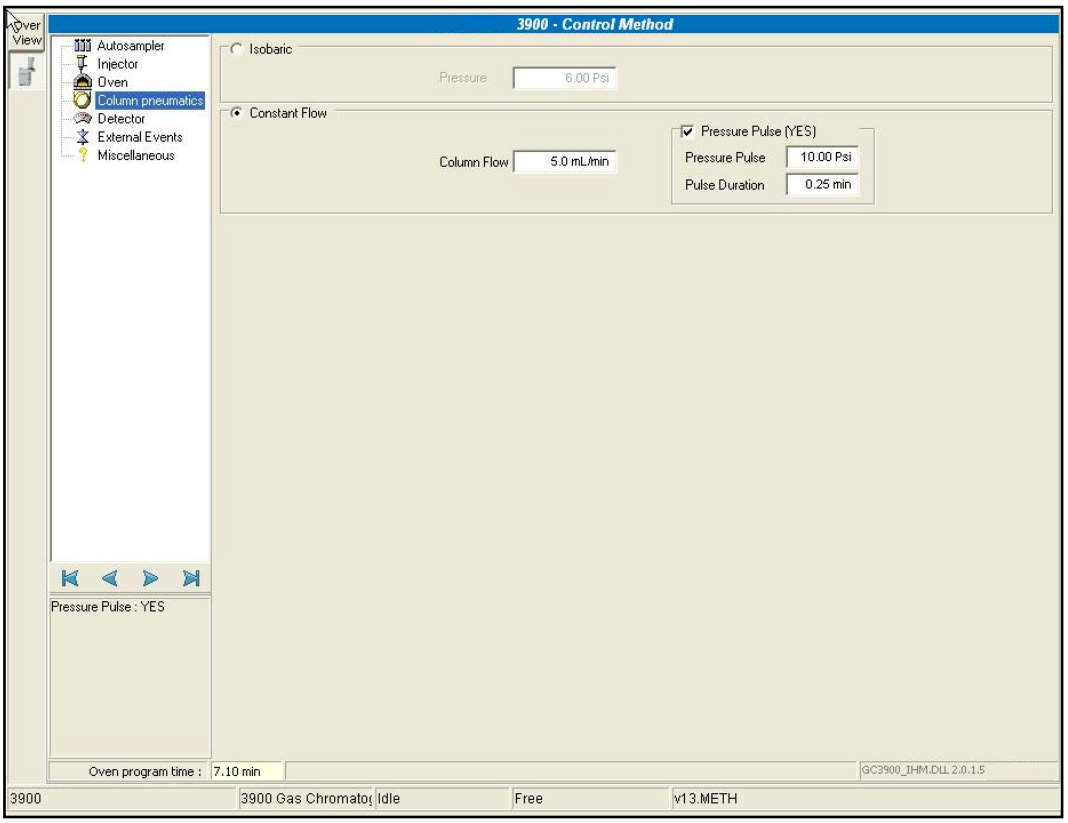
This parameter provides a safety measure to save coolant after the specified time if the column oven fails to reach its set temperature or the GC does not go into run. The valve will be turned OFF if the timeout period is reached and no further coolant will be applied.

NOTE: The browser always displays the current end time of the column oven program. If you enter program end times for components other than the column oven that exceed the column oven end time, a warning message will be displayed. The column oven end time determines the method end time. As a consequence, when the method is downloaded to the GC, component program end times that exceed the column oven end time will be truncated.

Column Pneumatics Control

The Column pneumatics window contains the Electronic Flow Control (EFC) Program which allows you to specify the pressure ramp of the Type 1 EFC or the pressure ramp and total flow time program of the Type 4 EFC. Type 1 EFC is specially used for the 1177 injector while Type 4 EFC is used for the 1041 injector.

Type 1 EFC



Isobaric Parameter Group

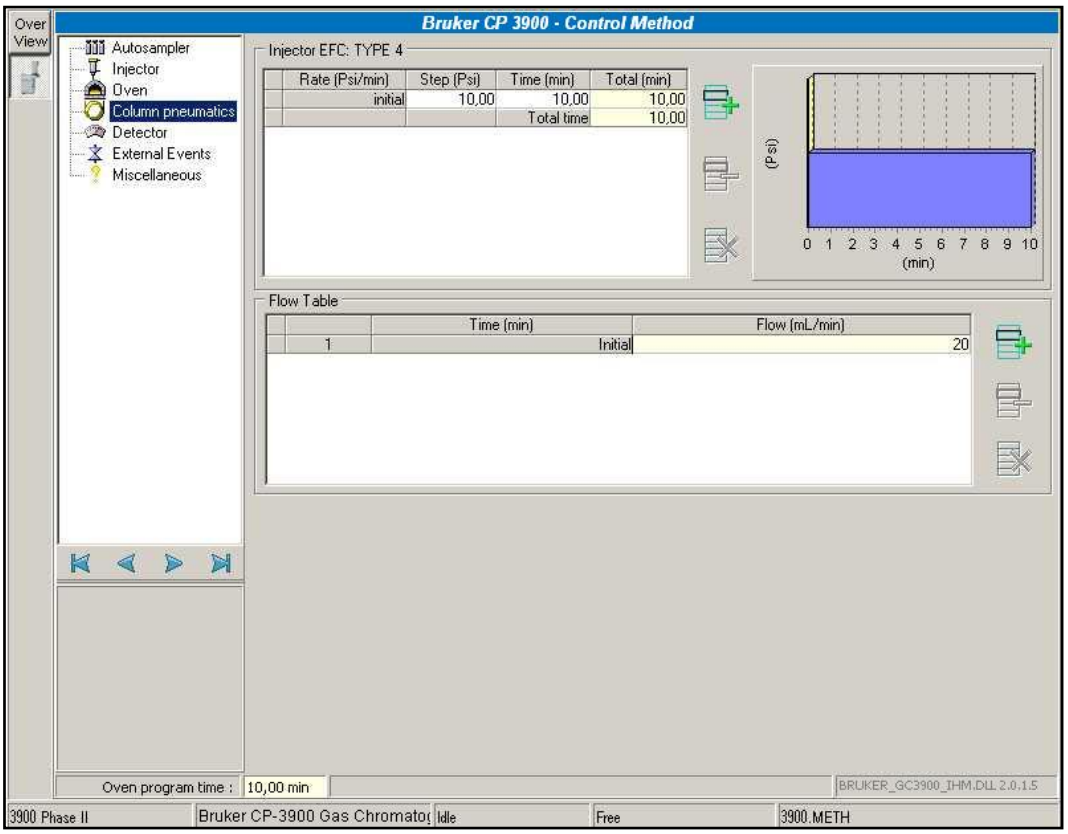
Check the Isobaric option to define a desired gas Pressure in the corresponding field.

Constant Flow Parameter Group

Check the Constant Flow option to disable the isobaric option and enter the desired constant Column Flow in the corresponding field.

Check the Pressure Pulse option to perform a pressure pulse injection. Prior to injection, the column head pressure will change to the Pressure Pulse pressure. After injection, the Pressure Pulse pressure will be maintained for the Pulse Duration.

Type 4 EFC



Injector EFC Parameter Group

Use the first spreadsheet to build a pressure ramp program.

The first row of the spreadsheet contains the Initial pressure and hold time for the Type 4 EFC. The EFC will equilibrate to this setting when the method is activated, and will be restored to this setting when each chromatographic run is completed. The rest of the spreadsheet contains the programmed settings for each of the ramp segments. Enter the final pressure of each ramp segment in the Step column (0.10 to 400.00 Psi), the Rate (0.01 to 400.00 Psi/min) and the Time (0.00 to 999.99 min) the EFC is held at this pressure in the corresponding columns.

NOTE: The graph shows the pressure ramp program.

Flow Table Parameter Group

Use the second spreadsheet to build a flow time program to control the Type 4 EFC total flow.

The first row of the flow spreadsheet contains the Initial Total Flow for the Type 4 EFC.

The EFC will equilibrate to this setting when the method is activated, and will be restored to this setting when each chromatographic run is completed. The rest of the spreadsheet contains the time-programmed settings for the total flow. The total Flow (1 to 1000 mL/min) will be switched to the value in each row at the indicated Time (0.01 to 999.99 min).

Use the following buttons to edit the table :

to add a line to the table.

to delete a line in the table.

to clear the entire table.

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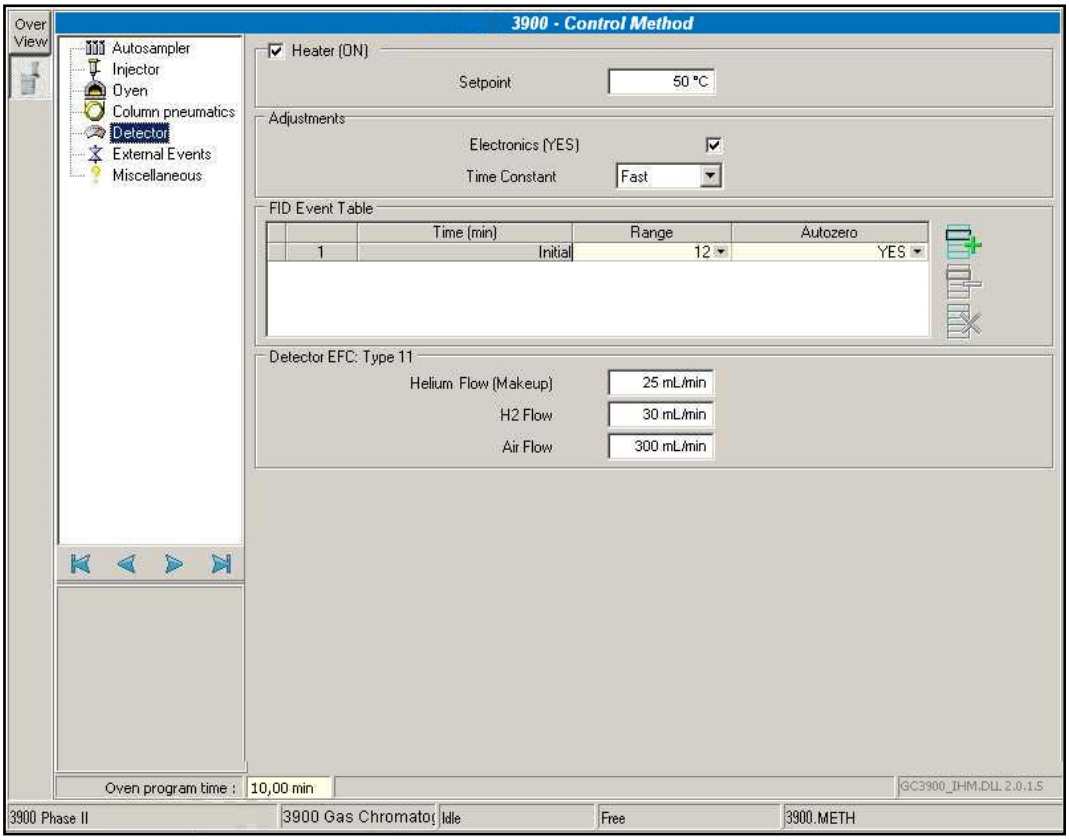
Detector Control

The Detector sub-section allows you to specify the operating temperatures, gas flow rates, and specific parameters for the FID (Flame Ionization Detector) detector or the TCD (Thermal Conductivity Detector) detector.

FID Detector



Check or uncheck the Heater option to turn the detector oven ON or OFF and enter the detector oven temperature in the Setpoint field (50 to 450 °C).

Adjustments Parameter Group

Check or uncheck the Electronics option to indicate whether the installed FID will be used or not. Select the required Time Constant from the list (Fast or Slow).

FID Event Table Parameter Group

Use the spreadsheet to change detector settings during the analysis.

The first row of the spreadsheet contains the Initial Range and Autozero for the FID detector. When the autozero is set to yes, it means the detector autozero is on continuously before the run starts.

The rest of the spreadsheet contains the time-programmed settings: the Range (9, 10, 11, or 12) and Autozero (Yes or No) will be switched to the value in each row at the indicated Time (0.01 to 999.99 min)

Use the following buttons to edit the FID event table:

to add a line to the table.

to delete a line in the table.

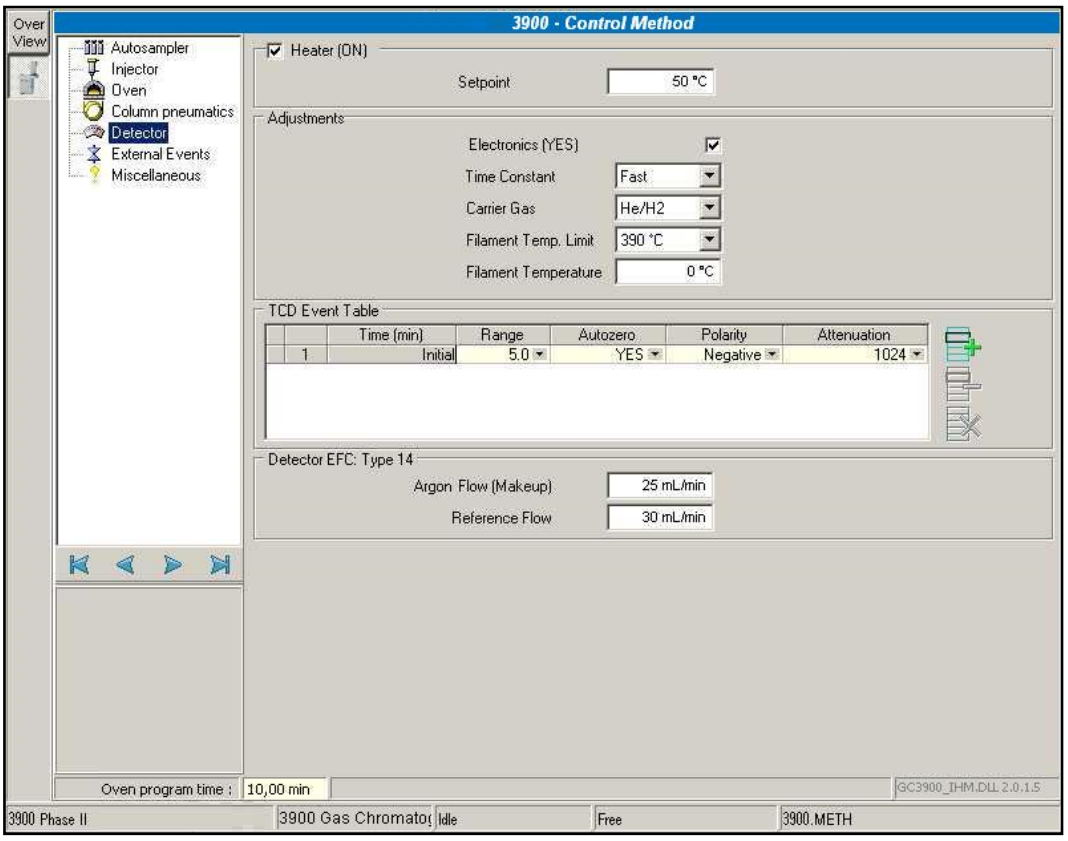
to clear the entire table.

Detector EFC Parameter Group:

The Type 11 EFC section allows you to define the desired gas flow rates [Helium Flow (Makeup), H2 Flow and Air Flow fields, 0 to 50 ml/min for the makeup and hydrogen flows, and 0 to 500 mL/min for the air flow].

NOTE: The Electronic Flow Control modules (EFC) are detector-specific and specified in the configuration manager. For FID detectors, the EFC Type 11 is required.

TCD Detector



Check or uncheck the Heater option to turn the detector oven ON or OFF and enter the detector oven temperature in the Setpoint field (50 to 450 °C).

Adjustments Parameter Group

Check or uncheck the Electronics option to indicate whether the installed TCD will be used or not. Select the required Time Constant from the list (Slow or Fast).

Choose the Carrier Gas: if you are using helium or hydrogen as carrier gas, select the He/H2 setting. For all other carrier gases, select the N2/Ar setting.

Specify the Filament Temperature in the corresponding field (0 °C to the maximum filament temperature) and select the Filament Temperature Limit from the list: to protect the filament, always operate the detector with the 390 °C limit selected unless you require the maximum dynamic range available to the TCD. With the limit set to 390 °C, the peak sample filament temperature is limited to approximately 450 °C. The temperature limit is approximately 550 °C at the 490 °C setting. The 450 °C limit protects filaments from oxidation when exposed to air over an extended period of time. However, at the 550 °C temperature limit the filament can degrade after only a few minutes.

TCD Event Table Parameter Group

Use the spreadsheet to change detector settings during the analysis.

The first row of the spreadsheet contains the Initial Range, Autozero and Polarity for the TCD detector. When the autozero is set to yes, it means the detector autozero is on continuous before

the run starts. The polarity is used to reverse the peaks that appear in the negative direction (for example, if you inject a standard or sample into the reference side of the TCD).

The rest of the spreadsheet contains the time-programmed settings: the Range (0.05, 0.5 or 5.0), Autozero (Yes or No) and Polarity (Positive or Negative) will be switched to the value in each row at the indicated Time (0.01 to 999.99 min).

NOTE: If you are also collecting the detector analog signal (via an analog output connected to a MIB-interface for example), you can define the required *Initial Attenuation* and change it during the analysis.

Use the following buttons to edit the TCD event table:

to add a line to the table.

to delete a line in the table.

to clear the entire table.

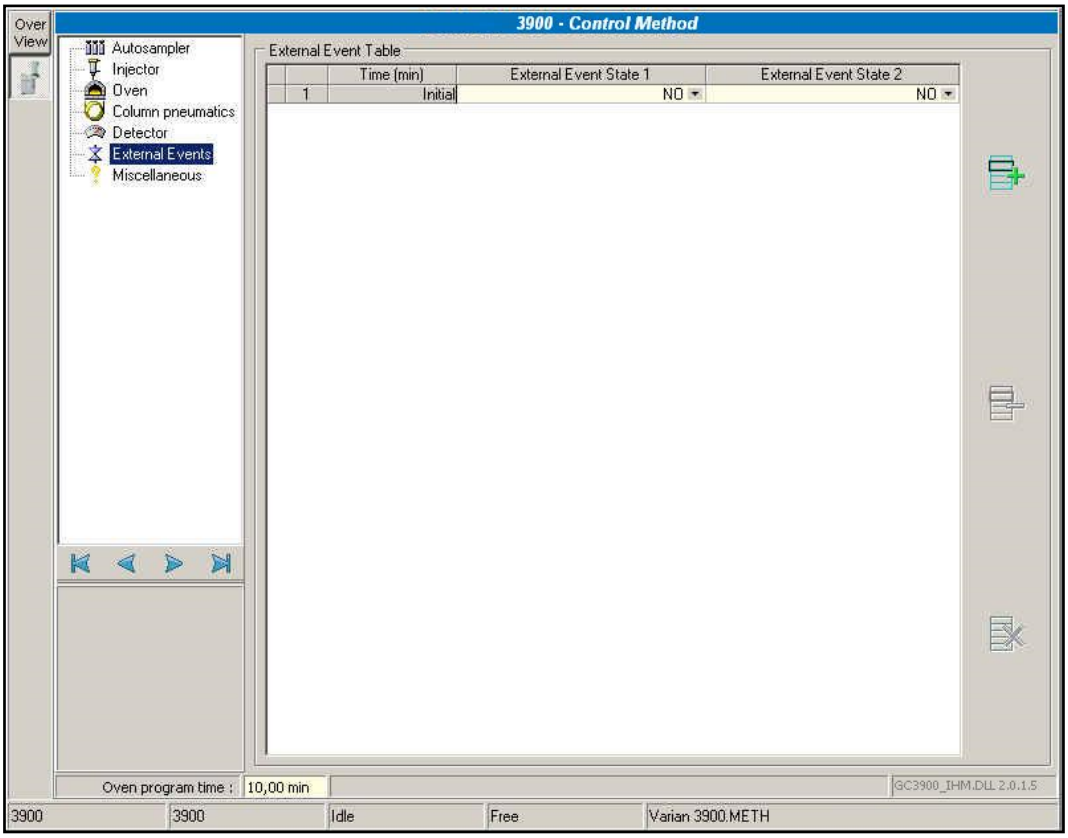
Detector EFC Parameter Group

If the detector Electronic Flow Control module is installed, the Type 14 EFC section will appear and allows you to define the desired gas flow rates (Makeup Flow and Reference Flow fields, 0 to 50 mL/min).

NOTE: The Electronic Flow Control modules (EFC) are detector-specific. For TCD detectors, The EFC Type 14 is required.

External Events Control

The 3900 GC can have up to two external events:



External Event Table Parameter Group

Use the spreadsheet to time program the external events. The first row of the spreadsheet contains the initial external events position. The External Event State 1 and External Event State 2 columns allow you to turn the relay associated with each external event ON (Yes) or OFF (No). :

Use the following buttons to edit the External Events table

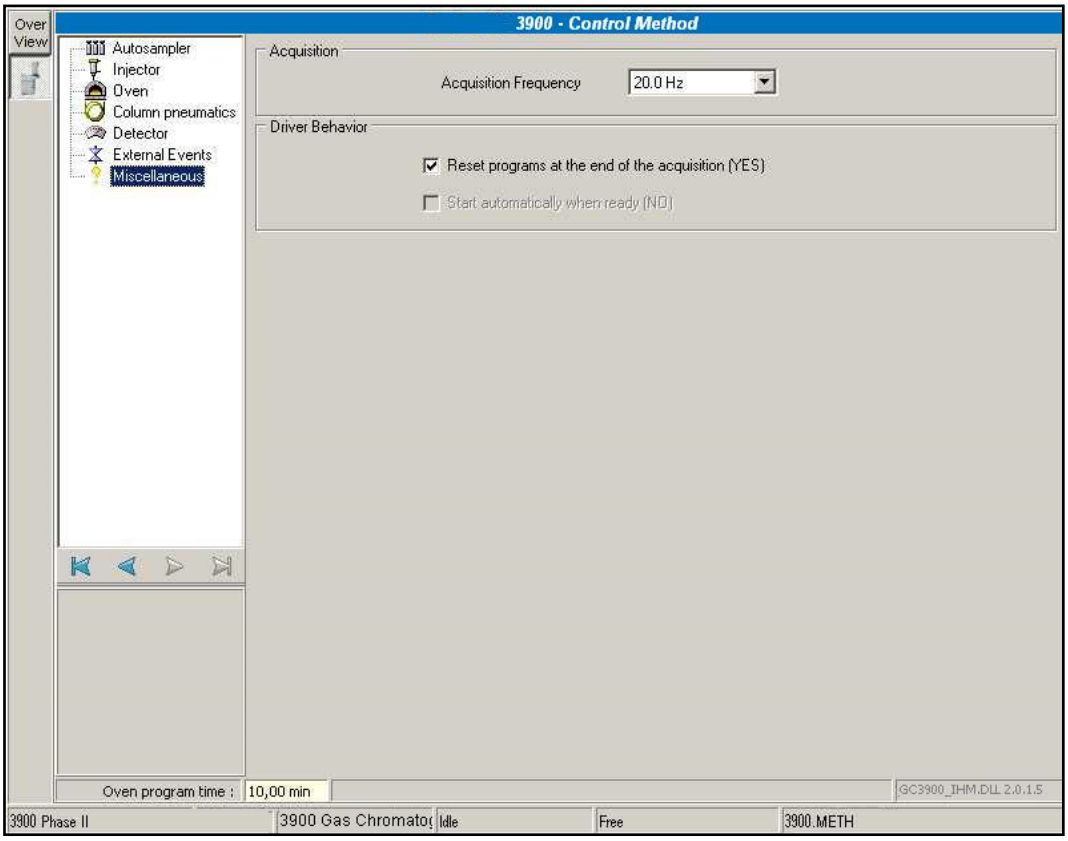
to add a line to the table.

to delete a line in the table.

to clear the entire table.

Miscellaneous Control

The Miscellaneous section contains parameters for data collection:



Acquisition Parameter

Enter the detector data rate in the Acquisition Frequency field. With decreased data rates, less disk space is required for storing the data. With increased rates, more data is collected, which may improve quantitation, particularly for narrow peaks.

Driver Behavior Parameter Group

Check or uncheck the Reset programs at the end of the acquisition to activate or deactivate this option. If it is checked and the acquisition is stopped from the acquisition window, the temperature programs will be reset before continuing with the next injection (if a sequence is running).

Check Start automatically when ready to start the GC without injecting. It could be useful in case of sampling valve use.

Starting and Viewing an Acquisition

Quick Start and Sequence

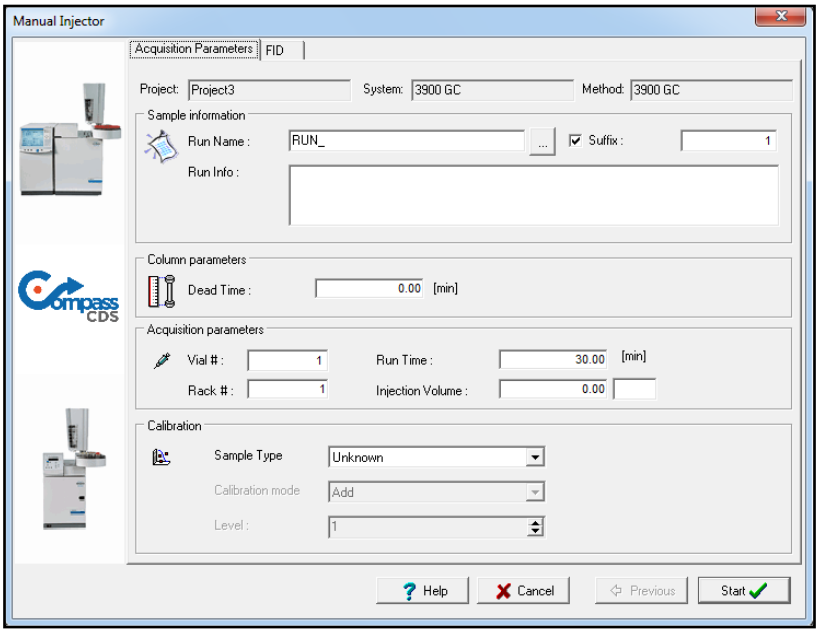
Once the instrument control method has been correctly programmed, an analysis can be started. The next section briefly describes how to start an acquisition.

Quick Start (Single Acquisition)

Press the button.

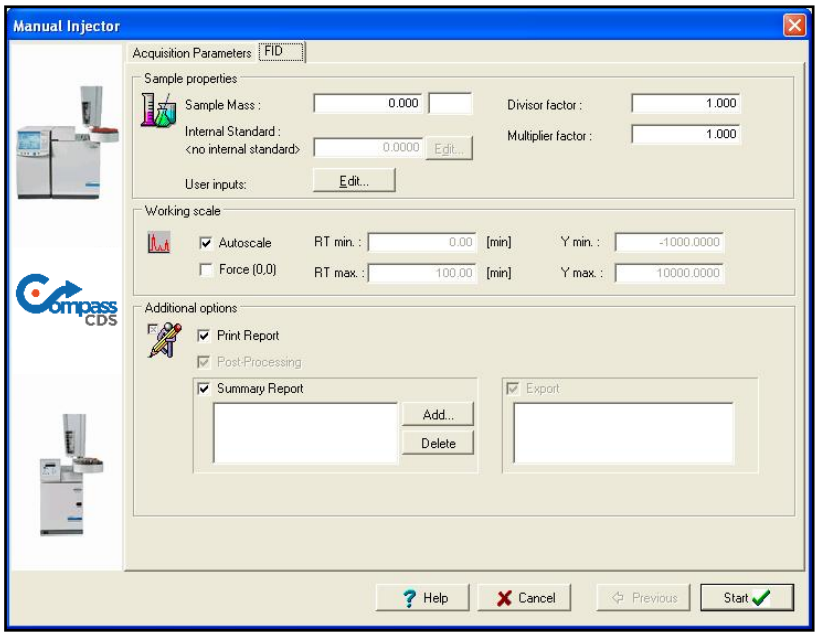
In the ***Quick Start*** window, select the system, the method, and optionally the project if connected in "All project" mode.

Press the OK button. The following screen is displayed:



In the *Acquisition parameters* tab, required fields like the *Run Name*, the *Run ID* and the *Acquisition length* must be filled before starting an analysis. Furthermore, if the system is equipped with an autosampler controlled by CompassCDS, the *Injection Volume*, the *Vial* position and the *Rack* number (if required) must be entered.

Other parameters associated with each acquisition channel can be entered in the *Channel X* or FID tab.

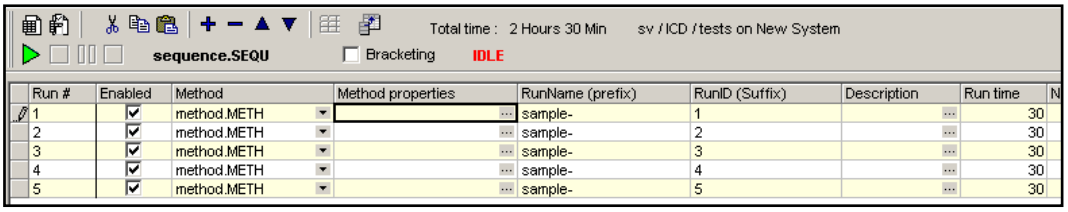


Click on the Start button to start the acquisition if the system is a single-injector system or click on the Next button if the system is a multiple injector system. In a multiple injector system, the same parameters entered for the first injector must be entered for the other injectors before starting the acquisition.

Sequence

To create a sequence, select the FILE / NEW SEQUENCE menu, and complete the displayed creation wizard screen (refer to CompassCDS User Guide), by entering the system name that will perform the analysis, the number of lines (corresponding to the number of samples) and the sequence name.

The sequence is displayed. Complete the sequence information columns (refer to the CompassCDS User Guide).



Run #	Enabled	Method	Method properties	RunName (prefix)	RunID (Suffix)	Description	Run time	N
1	☑	method.METH		sample-	1		30	
2	☑	method.METH		sample-	2		30	
3	☑	method.METH		sample-	3		30	
4	☑	method.METH		sample-	4		30	
5	☑	method.METH		sample-	5		30	

The *Method Name*, the *Run Name*, the *Run ID* and the *Acquisition length* must be filled in before starting the analysis. All these parameters are automatically imported from the acquisition part if defined in the method.

Start the sequence by clicking on the button.

NOTE: For more details about how to start an acquisition, refer to CompassCDS User Guide.

Running Acquisition Status

Viewing a Running Acquisition

To view a running acquisition, click on the Systems tab then select the running system. A window is activated which is composed of two parts: the running chromatogram and the status window where the driver modules are listed. If Dual View is selected then the acquisition will be observed while the sequence is running.

Status of the 3900 GC

Click on the button corresponding to the 3900 GC driver and the 3900 status screen will appear. It contains eight sub-sections: Autosampler, Injector, Oven, Column, Detector, External Events, Miscellaneous, and Overview. Click on the required sub-section to display the corresponding parameters that will be used during the chromatographic run.

A toolbar allows you to easily scroll through the status windows:

to select the first status window.

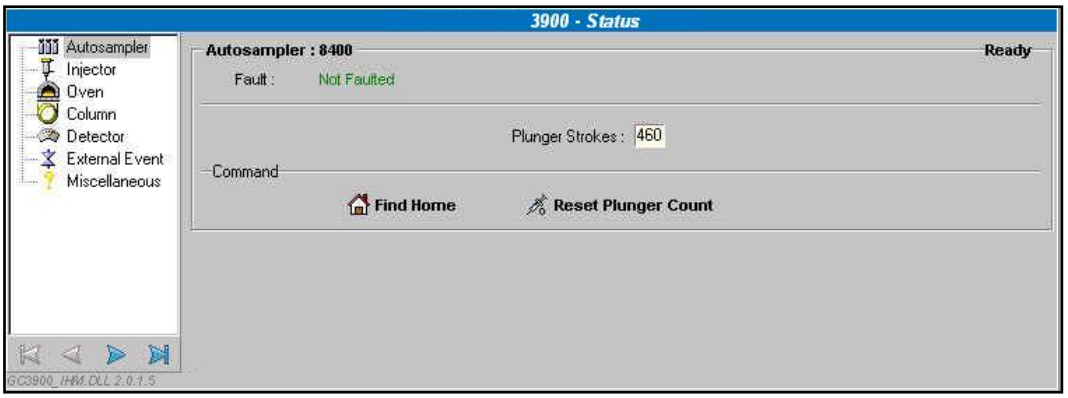
to move back to the previous status window.

to move forward to the next status window.

to select the final status window.

Autosampler Window

This section is only shown when 3900 GCs have either an 8400 Autosampler or an 8410 AutoInjector connected to them.



The autosampler status screen indicates the autosampler state (Ready, Homing, Sampling or Running).

Fault or No Fault: displays if a fault in the autosampler component has occurred. In this case, a new button appears:

. Click on it to clear the fault.

Plunger Strokes: displays the number of times that the syringe plunger has been moved up and down. This can be used to help monitor syringe wear and plan for syringe replacements.

Click on the

button to reset the number of plunger strokes.

Click on the

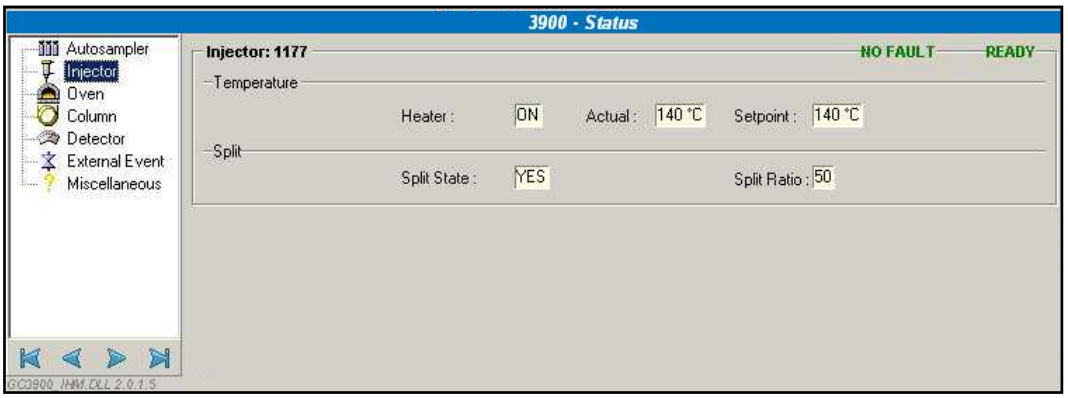
button to reinitialize the autosampler.

If an 8410 Autosampler is connected, the button

becomes available. Click on it to detect the tray orientation (1 to 10, 11 to 16 or 17 to 21).

Injector Window

1177 Injector



The following status parameters are available:

Ready or Not Ready: the injector oven is Ready if the setpoints have been achieved and stabilized. The injector oven is Not Ready if readiness to start a run has not been achieved or if, during a run, the oven becomes not ready or goes “out of tolerance”.

Fault or No Fault: displays if a fault in the injector component has occurred.

Heater: displays if the injector oven component is turned OFF or ON at the 3900 GC.

Actual: displays the actual temperature of the injector oven at the 3900 GC.

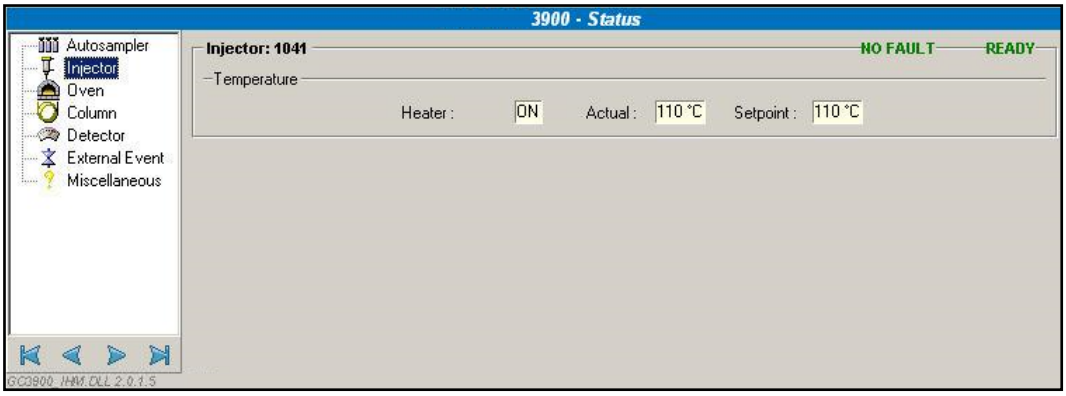
Setpoint: displays the injector oven programmed temperature setting in the active method. The 1177 injector is an isothermal injector.

Split State: displays the current split state of the 1177 injector method.

Split Ratio: displays the current split ratio of the 1177 injector method.

The split ratio is defined as the (Column Flow + Split Flow) / the Column Flow.

1041 Injector



The following status parameters are available:

Ready or Not Ready: the injector oven is Ready if the setpoints have been achieved and stabilized. The injector oven is Not Ready if readiness to start a run has not been achieved or if, during a run, the oven becomes not ready or goes “out of tolerance”.

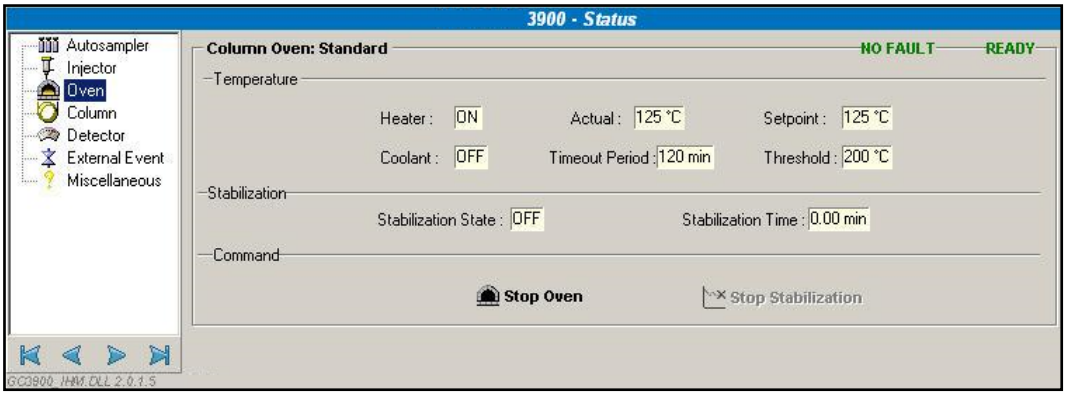
Fault or No Fault: displays if a fault in the injector component has occurred.

Heater: displays if the injector oven component is turned OFF or ON at the 3900 GC.

Actual: displays the actual temperature of the injector oven at the 3900 GC.

Setpoint: displays the injector oven programmed temperature setting in the active method.

Column Oven Window



The status display includes the following parameters:

Ready or Not Ready: the column oven is Ready if the setpoints have been achieved and stabilized. The column oven is Not Ready (No) if readiness to start a run has not been achieved or if, during a run, the oven becomes not ready or goes out of tolerance.

NOTE: Some reasons the GC may display Not Ready during a run are: the temperature program is too aggressive, the oven door is opened, the coolant runs out, or the power line voltage drops.

Fault or Not Faulted: displays if a fault in the column oven component has occurred.

Heater: displays if the column oven component is turned OFF or ON at the 3900 GC.

Actual: displays the actual temperature of the column oven at the 3900 GC.

Setpoint: displays the column oven programmed temperature setting in the active method.

Coolant: displays if the column oven coolant is enabled in the active method.

Timeout Period: displays the programmed coolant time-out value in the active method for the column oven.

Threshold: displays the programmed column oven temperature at which the column oven coolant is enabled.

Stabilization State: displays the current stabilization state of the oven. When the state is ON, the button

becomes active. Click on it to bypass the stabilization time.

Stabilization Time: shows the 3900 GC column oven stabilization time in minutes. The stabilization time counts down from the programmed method value and then displays 0.00 minutes when the stabilization period is over.

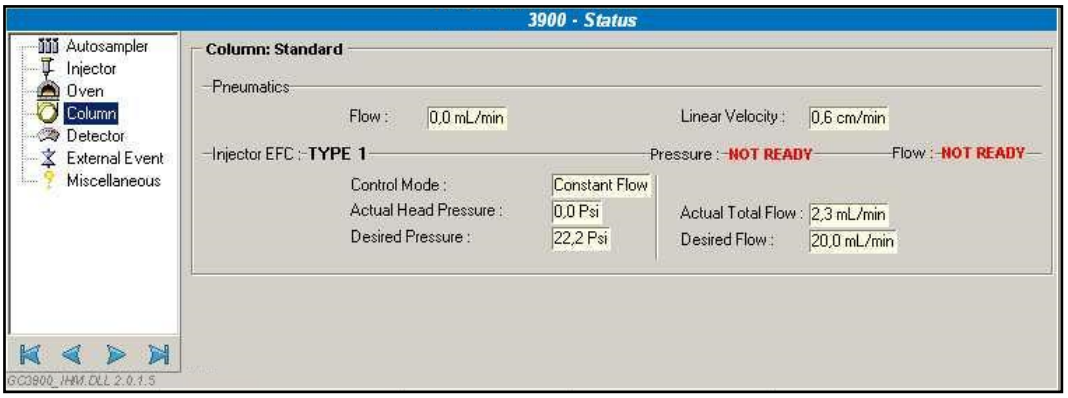
Click on

to turn off the oven when the oven is on.

Click on

to turn on the oven when the oven is off.

Column Window



The status display includes the following parameters:

Flow: displays, in mL/min, the column flow rate calculated from the column head pressure, column temperature, and column parameters (carrier gas, column length, and internal diameter).

Linear Velocity: displays the column linear velocity calculated from the column head pressure, column temperature, and column parameters (carrier gas, column length, and internal diameter).

The injector EFC type is mentioned (Type 1 for 1177 injector, Type 4 for 1041 injector)

Pressure: Ready or Not ready. The Injector EFC pressure is Ready if the setpoint has been achieved and stabilized.

Flow: Ready or Not ready. The Injector EFC flow is Ready if the setpoint has been achieved and stabilized.

Control Mode: displays the control mode of the EFC (isobaric, constant flow).

Actual Head Pressure: displays the actual column head pressure at the 3900 GC.

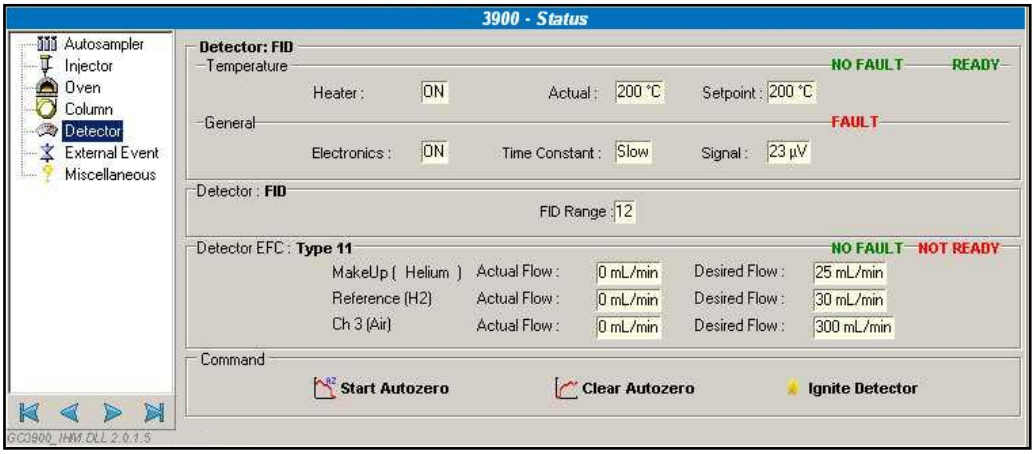
Desired Pressure: displays the programmed column head pressure setting in the active method.

Actual Total Flow: displays, in mL/min, the total flow rate through the system.

Desired Flow: displays the programmed column flow setting in the active method.

Detector Window

FID Detector



The status display includes the following parameters:
Temperature: Ready or Not Ready. The temperature of the FID detector is Ready if the setpoints have been achieved and stabilized.

Temperature: Fault or No Fault. Displays if a fault in the FID detector component has occurred.

Heated: displays if the detector oven component is turned OFF or ON at the 3900 GC.

Actual: displays the actual temperature of the detector oven at the 3900 GC.

Setpoint: displays the detector oven programmed temperature setting in the active method.

Electronics: displays the FID Electronics setting in the active method.

Time Constant: Fast (50 msec) or Slow (200 msec). Displays the electrometer time constant setting in the active method.

Signal: displays, in mV, the actual FID detector signal at the 3900 GC.

FID Range: 9, 10, 11, or 12. Displays the FID Range initial condition setting or the time-programmed setting in the active method.

If the detector Electronic Flow Control module is installed, the Type 11 EFC section will appear and displays the following parameters:

Detector EFC: Ready or Not Ready. The Detector EFC is Ready if the setpoints have been achieved and stabilized.

Fault or No Fault: displays if a fault in the Detector EFC component has occurred.

Make Up: displays, in mL/min, the setpoint and actual channel 1 flow rate (Make up).

Reference: displays, in mL/min, the setpoint and actual channel 2 flow rate (Hydrogen).

Ch 3: displays, in mL/min, the setpoint and actual channel 3 flow rate (Air).

Click on the

button to ignite the detector flame.

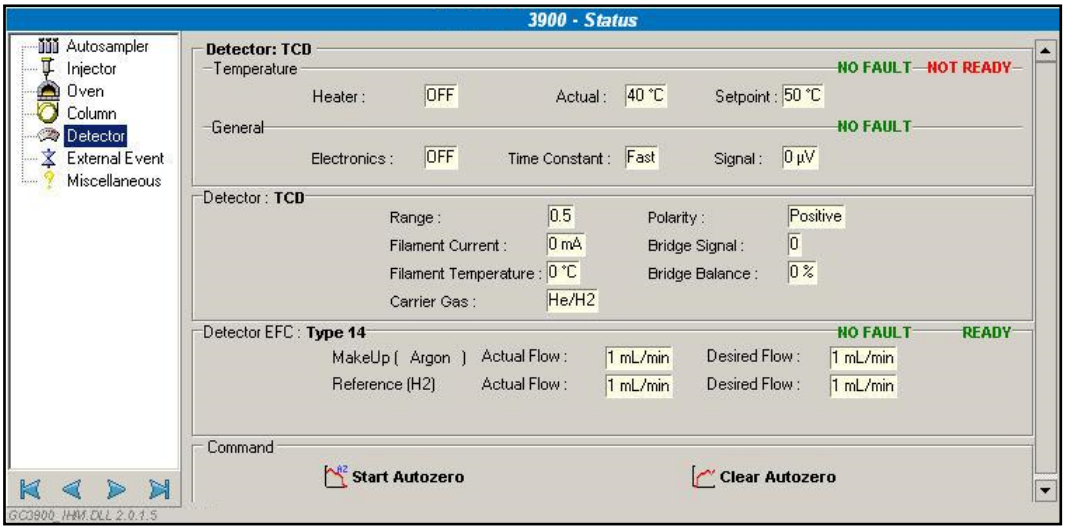
Click on the

button to launch the autozero of the detector.

Click on the

button to clear the autozero of the detector and get the raw signal from the detector (useful in case of diagnosis situation).

TCD Detector



Heater: displays if the detector oven component is turned OFF or ON at the 3900 GC.

Actual: displays the actual temperature of the detector oven at the 3900 GC.

Setpoint: displays the detector oven programmed temperature setting in the active method.

Ready or not ready: the TCD detector is Ready if the setpoints have been achieved and stabilized. The TCD detector is Not Ready if readiness to start a run has not been achieved or if, during a run, the TCD detector becomes not ready or goes “out of tolerance”.

Fault or No Fault: displays if a fault in the TCD detector component has occurred.

Electronics: displays the TCD Electronics setting in the active method.

Time Constant: Fast (50 msec) or Slow (200 msec). Displays the electrometer time constant setting in the active method.

Signal: displays, in µV, the actual TCD detector signal at the 3900 GC.

Range: 0.05, 0.5, or 5.0. Displays the TCD Range initial condition setting or the time-programmed setting in the active method.

Filament Current: displays, in mA, the actual TCD current.

Filament Temperature: displays the TCD Filament Temperature setting in the active method.

Carrier Gas: displays the carrier gas setting in the active method.

Polarity: displays the TCD polarity initial condition setting or time-programmed setting in the active method.

Bridge Signal: displays the actual TCD bridge signal.

Bridge Balance: displays the TCD bridge balance (%).

The Type 14 EFC section will display the following parameters:

Ready or Not Ready. the detector EFC is Ready if the setpoints have been achieved and stabilized.

Fault or No Fault: displays if a fault in the detector EFC component has occurred.

Make Up: displays, in mL/min, the setpoint and actual channel 1 flow rate.

Reference: displays, in mL/min, the setpoint and actual channel 2 flow rate.

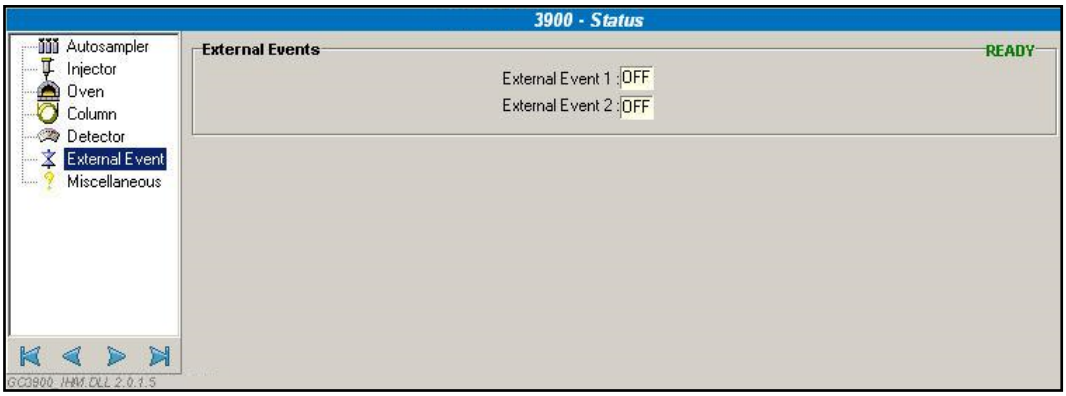
Click on the

button to launch the autozero of the detector.

Click on the

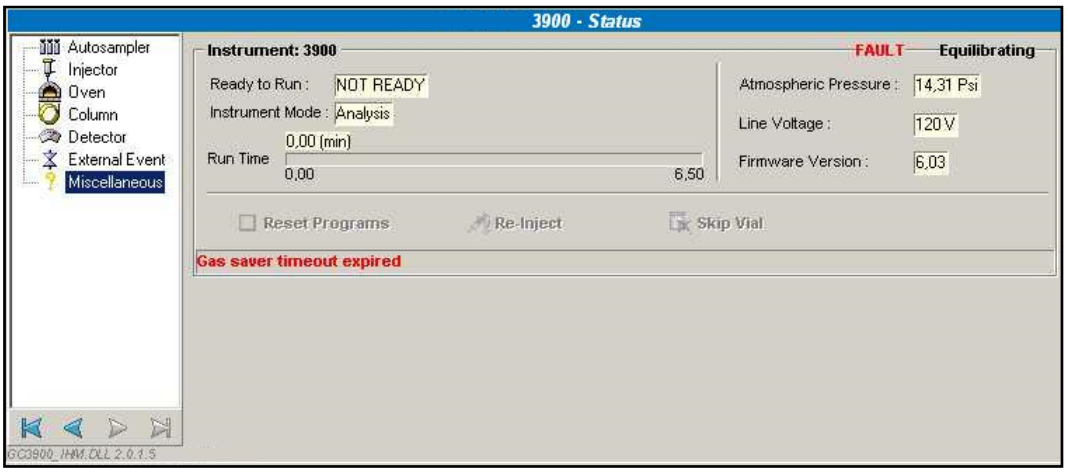
button to clear the autozero of the detector and get the raw signal from the detector (useful in case of diagnosis situation).

External Events Window



The status screen displays the current state of each external event.

Miscellaneous Window



The miscellaneous screen contains general information about the current run, the overall state of the instrument and the GC Firmware Version.

The state of the instrument (Ready, Running, Stabilizing, Equilibrating, Computing, Needs Monitor, Monitoring, Sampling, Connecting, or Not Ready) is displayed.

A Fault / No Fault indicator is also shown. When a hazardous or disabling fault occurs, any run in progress will halt and the affected component will shut down. If the fault is recoverable, then the run is not terminated.

The run time bar displays the elapsed time in minutes since the beginning of the run and the end time.

Atmospheric Pressure: displays the current value of the atmospheric pressure calculated by the GC.

Press the

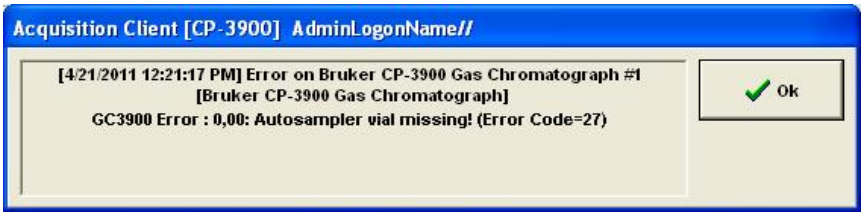
button, to reset the GC. If it is RUNNING, the GC aborts the current run, goes to the READY state and continues with the next injection in the sequence. This button is equivalent to pressing the Stop on the front panel of the GC.

When a vial is missing during a sequence, a warning message appears and you have 10 minutes to replace the sample in the correct position before the system skips the missing vial and passes to the next line of the sequence, or stops the run. When you have replaced the missing sample, you must press the

button to restart the run.

If you want to skip the missing vial and start the next run, you must press the

button.

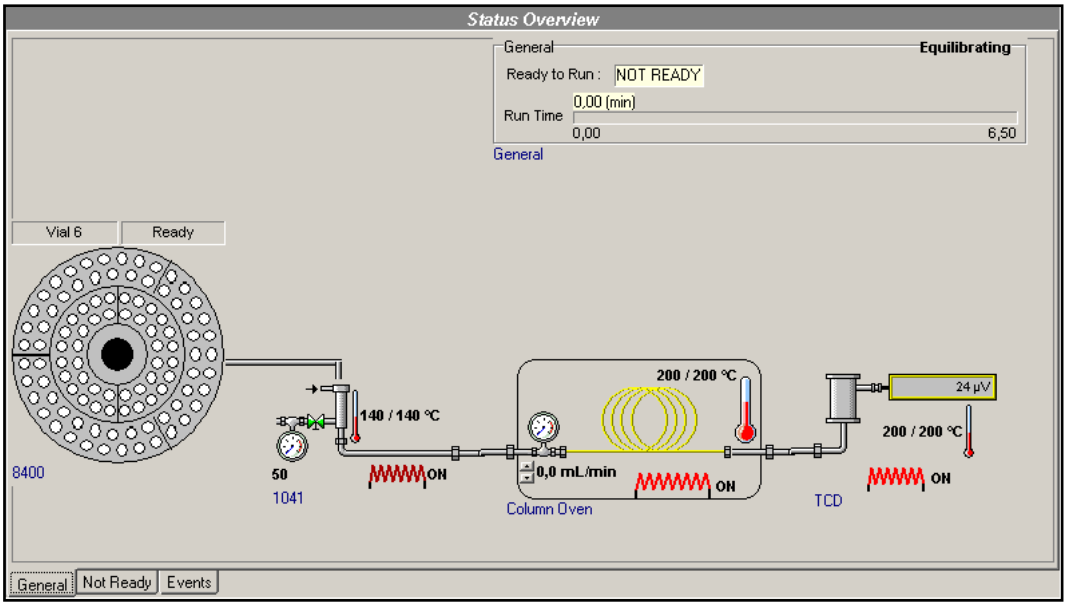

Acquisition Client [CP-3900] AdminLogonName//
[4/21/2011 12:21:17 PM] Error on Bruker CP-3900 Gas Chromatograph #1
[Bruker CP-3900 Gas Chromatograph]
GC3900 Error : 0,00: Autosampler vial missing! (Error Code=27)
Ok

Warning message when a vial is missing.

Overview Window

Click on the Over View button: the Status Overview window is displayed and contains three tabs:

General: displays the synopsis of the instrument, where some current values can be read (temperatures, pressures, and signal).



When the mouse points to a colored vial (yellow for current vial, green for already used vial and red for missing vial), the current vial number and the number of injections are displayed.

The flow and temperature (current and setpoint) for each module and the signal values are displayed. You can choose to display the flow, the pressure or the velocity of the gas in the column by clicking on the button.

Not Ready: contains the not ready information sent by the instrument.

Events: contains the events that have occurred on the instrument, listed below:

3900 GC Faults

-5V / +5V out of range	The –5V / +5V power lines are outside of their allowed tolerance for correct GC operation.
ADC Calibration failure	Activate a method to clear this fault. If the fault recurs, turn the GC off and then on.
Board Failure	The 3900 just detected that the specified detector has a failed electronics board.
DAC Calibration failure	The DAC (Digital to Analog Converter) that supplies the analog output signal failed to calibrate within its set tolerance. Turn off the power and then turn it back on.
DIAG Temp. out of range	The actual temperature of a temperature controlled resistor block used for automatic instrument calibration has exceeded its allowed temperature set point. Turn the power to the GC off and then on again.
Fan unplugged during run	Turn off instrument and turn it back on.
FID Flame out	The FID flame has been quenched. The flame detection is based on a background signal intensity of approximately 330 microvolts. It is possible for very clean GC systems to have baselines less than 330 microvolts causing spurious flameout messages. If you suspect that the flameout message is spurious, use a shiny, cool metal object (such as a box end wrench) and hold it just above the FID tower being careful not to get too close to the hot surfaces. If you observe condensation, then the flame is still lit; you may wish to change your fuel gas mixture or some other operating characteristic that would allow a slightly higher background signal. Once a flame out is detected, the system will attempt to ignite the flame 3 times before reporting the flame out condition. The fault is cleared by either igniting the flame using the Ignite FID Flame! Command or by turning the Detector electronics off and then on again.
Gas saver timeout expired	The GC has been idle for a period of time equal to or greater than the set Gas Saver timeout period. Activate a method to clear the fault.
Internal Temp. limit exceed	Turn off instrument and turn it back on.
IOP Communication failure	Turn off instrument and turn it back on.
Lower than minimum temp	The 3900 just detected that the specified component temperature zone has gone below its minimum temp.
Max setup temperature limit exceeded	The 3900 just detected that the specified limit exceeded component temperature zone has exceeded its maximum setup temperature limit.
Maximum temp has been exceeded	The 3900 just detected that the specified component temperature zone has exceeded its maximum temperature.
Step motor moving	The column oven vent stepper motor has failed to reach its internally set position within the step tolerance. Turn the power off and then on again
Temp probe is open	The 3900 just detected that the specified component temperature zone probe has an open circuit.
Temp probe is shorted	The 3900 just detected that the specified component temperature zone probe has a short circuit.
Temp probe response is too fast	The 3900 just detected that the specified component temperature zone probe is responding too fast.
Temp probe response is too slow	The 3900 just detected that the specified component temperature zone probe is responding too slowly.
Thermal runaway	The 3900 just detected that the specified component temperature zone has begun thermal runaway.

Autosampler Faults

84x0 communication	The Autosampler/AutoInjector has experienced an error during communications that was unrecoverable. Power off both your GC and the autosampler, Turn on power to the GC followed by turning on the power to the autosampler.
84x0 faulted	The A/S has failed to properly come up. Turn off the power and then turn it back on.
84x0 carousel error	The A/S carousel base has encountered one or more internal faults and has failed to properly come up. Turn off the power and then turn it back on.
84x0 carousel sensor not found	The autosampler carousel sensor has failed to conform to its expected operation. Turn the GC off then on again.
84x0 maximum plunger speed exceeded	This message is displayed if you have built a method with one syringe that supports a fast injection speed and have subsequently changed and configured a different syringe. Correct the syringe speed in your method for the new syringe
84x0 plunger error	The syringe plunger has either jammed or become inoperable. Check that the syringe is properly mounted and that you have free movement of the plunger. Replace the syringe if required.
84x0 plunger strokes exceeded limit	This is an advisory message that the plunger limit stroke count has exceeded the limit that was set for it. You should change the syringe and zero the plunger stroke counter soon after you observe this message.
84x0 plunger sensor not found	The autosampler plunger sensor has failed to conform to its expected operation. Turn off the GC and then on again.
84x0 run not started after injection	Restart Automation to clear this fault. If it recurs, check that the inject switch installed on the injector nut is functioning properly.
Run ended before injection	The autosampler failed to complete the injection sequence. Restart a run to clear the fault
84x0 syringe sled sensor not found	The syringe sled is either jammed or miscalibrated. Recalibrate your vial and injector positions making sure that the syringe sled has a small clearance (consult your manual) above vials and does not compress the injector switch on the injector.
84x0 syringe volume exceeded	The total volume of the sample, air gaps (if any), solvent plugs (if any), and internal standards (if any) exceeds the capacity of the configured syringe. Note that this error is only sensed at the time of injection. Check your method and correct any volumes that are excessive.
84x0 syringe missing	The autosampler has sensed that the syringe is not installed. Check that you have a syringe installed.
84x0 tower error	The autosampler tower has one or more internal faults and has failed to properly come up. Turn off the power and then turn it back on.
84x0 tower sensor not found	The tower sensor does not conform to its expected operation. Turn the GC off and then on again.
84x0 tray is missing	The 8410 sample tray has been removed from the base. Replace the tray; the 8410 should automatically sense that the tray has been replaced.
84x0 vial missing	The autosampler has failed to detect a vial within an expected range of vials. This message is an advisory message. If you have a vial in the position and it has been missed, check that a septum is installed. Lack of a septum and dark colors may cause the tower sensor to fail to identify the vial.
84x0 vial sensor bad	The autosampler vial sensor has failed to conform to its expected operation. Turn off the GC and then on again.
8410 Vial is unreachable	This message informs you that the 8410 tray is oriented such that the requested sample vial does not fall under the arc of the tower. Re-orient the tray or change the requested vial from which you intend to inject to correct this